

AGRICULTURAL JOURNAL, Vol. XXI

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EDITORIAL NOTES.

The old order changeth, and there is nothing retrograde in the fact that henceforth the *Agricultural Journal* will be issued monthly instead of fortnightly. Its contents will be equal in volume to two of the old fortnightly editions, and it will go forth to its recipients, not in a folded condition, but spick and span, fresh from the printer's office, without a crease, in a respectable flat official envelope. This departure will enable writers in the magazine, especially those who may contribute continuously, to bestow more time upon their effusions,

and, on the assumption that a plethora of *Journal* creates undue familiarity, which in turn is apt to breed contempt, the new *Journal* will be removed from such a danger. An important advantage gained by the monthly issue is the opportunity that will be given to the Editor to visit the farmers in the country, and this is one of the objects of the change.

The Editorship of the *Journal* will in the future be in new hands. Mr. Burton, who has filled the position since November last, has recently almost relinquished the work in order that he might bestow most of his time upon the compilation of a Handbook for the guidance of settlers coming into the Colony. He has from time to time travelled in the country extensively for this purpose. When the manuscript is completed he leaves for the Transvaal to begin the issue there of an *Agricultural Journal* for the Imperial Government.

We fear that the press censorship has had a disastrous effect upon the circulation of the *Agricultural Journal* during the last twelve months. In many country towns it has been the rule that all newspapers should be retained in the post office for weeks, and sometimes for months, and we have frequently observed piles of *Journals* bundled away among the flotsam and jetsam of the post office, some of them containing the admirable report of Mr. Willcocks upon irrigation in South Africa. We feel all the sorrier for this because the farmers of the Cape who have a practical interest in the subject may have missed the opportunity of expressing their views in response to our invitation in a recent issue of the *Journal*. Of course a few of them have received the magazine in time to enable them to read the report in its freshness. We publish under *Queries and Replies* extracts from a letter upon the subject. One of the correspondents points out that 2,000 morgen of land could be brought under cultivation by irrigation near Worcester, but that under the Colonial Law relating to Water Supply a certain furrow which is necessary as a conduit cannot be touched, so that land as fertile as any in the Worcester district lies idle. We hope this statement is not correct. The same correspondent makes an allusion to the value of irrigation from the Wilge River under Mr. Willcocks' scheme, which seems worthy of attention.

The enterprising firm of Agricultural Implement Importers Messrs. Malcomess & Co., East London, have sent us a report from the Grahamstown *Journal* referring to the "Rotary Dutchman" disc plough, which they import, and for the information of our readers we republish, under *Queries and Replies*, a few points which they have sent to us about the plough.

We call attention to the letter of a correspondent under Queries and Replies, referring to the use of millet hay as ensilage, and its use *alone* as a food for horses. We shall be glad to receive opinions on the subject from anyone who has used the fodder largely in this way.

In the near future it will be recognised by the world at large that the farmers of Cape Colony are a race of irrigators. We have, therefore, considerable pleasure in briefly referring to a *Handbook on Irrigation Farming* which has just reached our Editor's room; a handbook for the practical application of water in the production of crops. The author of the book has devoted the greater portion of his life to practical irrigation work. The principal chapters treat of the advantages of irrigation; treatment of alkali; water supply; canal construction; reservoirs and ponds; flumes and their structure; methods of applying water; irrigation of field crops, the garden, the orchard, the vineyards, and small fruits; lucerne; windmills and pumps; sub-irrigation and sub-soiling; seepage and drainage; irrigation in humid regions, etc. The volume is profusely illustrated, and neatly and strongly bound. It contains 500 pages, and is well worth the price, post paid, 8/-. The book may be obtained from the Orange Judd Company, New York, United States of America.

This seems to be a fitting opportunity for urging our readers to contribute letters or articles upon the varying phases of the Cape rural industry. The change in the mode of issuing the *Journal* will, we believe, cause it to be read and preserved by every reader. Therefore we would ask those who have written for our pages in the past, and written well, to please come again. Those who pretend to no literary ability may express themselves as they like, so long as they make their meaning plain. Facts are wanted—facts that will do the country good by the narration. There may also be wrongs whose proper ventilation in an official *Journal* like this may be righted by the mere publication.

Attention is drawn to a letter under Queries and Replies from Mr. C. Lee, Senior, President of the South African Goat Breeders' Association, in which he objects to the strictures of a recent visitor from America who was in search of cheap Angora goats. Mr. Lee must in turn come under our displeasure if he encourages piratical gentry to come from other countries for our Angora goats. We cannot think that he read our Editorial Notes of February 13th last upon this subject. Let us stick to our goats and ostriches, Cousin Jonathan has already drawn heavily upon our Angoras, and our trade in mohair may be, in consequence, injuriously affected.

QUERIES AND REPLIES.

Correspondents who are reluctant to see their names and address published with their letters, are kindly requested to attach a nom-de-plume or initials in brackets after their signatures.

Australian Bug.

I should be glad if you would kindly inform me which is the best insecticide to be used to kill the Australian bug on orange trees, also whether you can supply me with ladybirds for this purpose or whether you advocate any other preferable means. My trees are being completely spoilt by this pest, and if you could advise me as to the best means to clear same I should be greatly obliged. In answering my query kindly let me know prices for ladybirds or any other methods to be used.

J. J. C.

Mount Stewart.

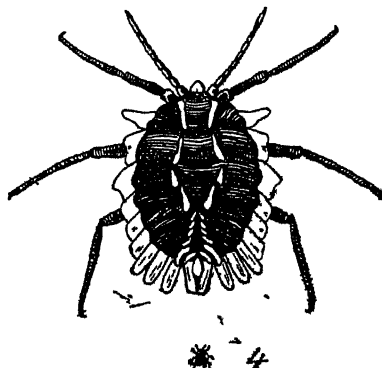
Resin wash is the best insecticide for the Australian Bug. Strong soft soap water, a pound to two and a half gallons, is also very good. Hydrocyanic acid gas kills all the living insects and most of the eggs. Destruction by the hand is often the simplest and cheapest remedy when the trees infested are small and few in number and the infestation slight. But when it pays to trouble with the insect at all, it is generally time to introduce the *Vedalia* ladybird, which is an efficient natural enemy. This creature is spread all over the Colony and nearly always puts in its appearance without assistance, but sometimes fails in the case of outbreaks of the Bug on isolated farms. There is always some Bug and some *Vedalia* to be found about the large towns, where vegetation is abundant. This is the case about Cape Town, and for several years the Department has undertaken to collect *Vedalia* specimens here and forward them to localities where outbreaks occur. The collecting costs a great deal in trouble and time. Probably the average expense for a colony is between £4 and £5, so the Department endeavours to restrict the sendings to strictly needy cases and to this end imposes a nominal charge of ten shillings. Sometimes for months together it is exceedingly difficult to find enough *Vedalia* to make a good sending. The winter is always a bad time for the collecting, and by experience it has been found that winter sendings are often unsuccessful. The cold makes the creatures inactive to a considerable degree, and before there is time under this condition for them to propagate the specimens may have become scattered or have fallen victims to enemies. It also seems that the ladybird is apt to

die out during the winter. This seems to be the case on the high veld of the Transvaal and other northern parts, but not anywhere in the south, east or west of this Colony. The Australian Bug can do little damage through the winter, for it, like the ladybird, is half dormant. The correspondent, I think, had best let matters stand until October. Then if the ladybird has not appeared he might apply formally to the Department, remitting 10s. to cover the nominal fee, for a colony of Vedalia.

CHAS. P. LOUNSBURY, Entomologist.

Orthezia Insignis.

I am posting you some specimens of a new bug, which is doing considerable damage here. I have not come across this bug before, and cannot discover anyone who knows it. May I ask you to be good enough to name it for me.



Female *Orthezia* before its egg-sac has grown (enlarged). A Same, natural size.

Up to the present I have only heard of one garden (Mr. H. B. Christian's) being affected. The bug seems partial to *Tecoma*, *Coleus* and *Bougainvillea*, and unless destroyed will no doubt take anything that comes in its way. I am endeavouring to get rid of them with paraffine emulsion, and shall try everything until successful.

O.S.C.

Port Elizabeth, June 13th.

Colonial Bacteriological Institute,
Grahamstown, June 19th.

As I informed you in my telegram of the 17th instant, I have forwarded to you specimens of a new bug found in this district and shall be greatly obliged if you will identify it and inform me. Yours

I am informed that these bugs are destroying *Tecoma mackenziei* and *Coleus* at present, especially the former, which are quite

blackened and stripped of foliage. The bugs are also attacking the *Bougainwillia*. They appear to be thick on other plants but not to have made much headway as yet in destroying them.

I am, etc.,

ALEXANDER EDINGTON, M.D.

C. P. Lounsbury, Esq., B.Sc.,
Government Entomologist.

The insect is *Orthezia insignis*, a pest which was discussed at length in the *Agricultural Journal* a few years ago under the heading "Another Introduced Scale Pest" (March 31st, 1898). It now seems to be making itself felt in various centres. A number of lantana hedges in the Cape Town suburbs became badly affected during the past summer and were taken out and burned. Equally severe measures may be justified in the outbreaks at Port Elizabeth and Grahamstown. An outbreak at East London may be expected at any time, as the insect was there known as a house plant pest four years ago.

CHAS. P. LOUNSBURY, Entomologist.

Lincoln-Merino Crossbreds.

Where are young rams to be obtained, first cross between Lincoln and Merino? Anybody having same might write direct to J. W. van Zyl, Tzamenkomst, District Colesberg.

Cross-Breeding.

With reference to the note in the *Journal* of the 22nd May, in which Dr. Hutcheon recommends Lincoln rams for grass veld and Shropshires for Karroo veld, I take it to mean cross-breeding for stock to supply butchers.

The Shropshires are claimed to be hardier in cases of drought, with a heavier fleece of wool.

The Lincolns being larger animals and maturing sooner, lambs at four teeth might be considered full grown. Then, like here, where in some seasons there is an abundance of "steek grass," the animals having long legs and being covered with hair instead of wool does not affect them much.

I had rams from both kinds first cross, and it does not seem to me that the progeny from one sort suffers more in a drought than the other.

J. W. v. Z.

Tzamenkomst, District Colesberg.

It is not generally the practice to use a first cross-bred ram for stud purposes. Perhaps some of our readers may have an opinion or experience in the matter.

Paspalum Dilatatum Grass.

With reference to Mr. Peacock's inquiry regarding *Paspalum dilatatum* grass in the last issue of the *Agricultural Journal*, we would invite attention to pages 130 and 253 of volume xx. of this publication.

Of six trials made in various localities of quantities of the seed imported by this Department from New South Wales, three have been reported on, viz.:—

Mr. N. J. Beukes, Superintendent of Cala Experimental Farm :—

“With reference to the seed of this grass which you forwarded on the 8th January last, I have to say that on the 10th February I sowed 50 square yards and three small beds. Owing to the excessive and prolonged drought (as I think) this seed did not grow at all except a few blades that appeared on the beds. On the 17th, February I sowed another four beds, having previously soaked the seed in clean cold water for 24 hours. Four days subsequently the grass sprang up and is now four inches high. It is a strong healthy grass and stands the heat well. It is, however, greatly hindered by the small wingless grasshoppers. Frequently I have to cover the beds from these pests. On the 3rd March I sowed another two beds that grew well, and on the 17th March I sowed another plot of 100 square yards but up to the present it has given no sign of life, this being due to want of rain.”

Mr. H. G. Flanagan, Prospect Farm, Komgha :—

“The *Paspalum dilatatum* seed the Department kindly sent me a few months back came rather late in the season for sowing, the weather being dry at the time. However, I sowed six rows of the seed in my garden, watering it well, and I was pleased to find that the seed germinated readily, and from the little plot alone I hope to obtain a number of roots for planting out next spring or summer.”

Messrs. Havers Bros., Thelema, Stellenbosch :—

“Unfortunately the sowing of the *Paspalum dilatatum* grass was followed by a long spell of dry weather and the seed failed absolutely.”

As drought and other causes have militated against a proper trial of this seed, which has been so favourably reported on in the Australian Colonies, this Department is taking steps to import a further quantity of seed. When this arrives notice will be given in the *Journal*, and applicants will then have an opportunity of procuring some.

Chicory.

We have received an enquiry from a correspondent about the nature of chicory. The following is an extract from the reply forwarded to him from the notes of the Government Botanist upon the subject:—

"Chicory is often grown here under the name of 'Witteloof' and is frequently confused with its congener *endive*. In Holland and Belgium the seed is thinly sown in drills, top-dressed with a little quicklime to keep off slugs and snails, and ultimately thinned out to about 8 or 10 inches distance. No particular culture is required beyond keeping the rows clear of weeds. In America, running tools like the 'Planet Jr.' are used; in Belgium it is generally forked over. The size of the root depends mainly upon the depth of the trenching or ploughing the ground has received. Crop is ready for forking out or ploughing out in about five months, and averages 3-6 tons per acre. Roots are first washed and rapidly air-dried. Then they are cut up into small sections (chicory-nibs) and desiccated perfectly in kilns. The roasting, similar to that of coffee, is conducted in revolving iron cylinders placed slantwise over a kiln-fire and furnished with a screw-like internal core which causes the roasting material to creep along the whole length of the tube at a definite speed according to the heat of the fire, and delivers it of an uniform ochre-brown colour at the lower end. Two pounds of clean fat are added to each cwt. before roasting, and this acts like the housewife's bit of butter on her coffee in the burning. It gives a glaze and makes the chicory hold together when pressed in the palm of the hand, a test foolishly supposed to show goodness of quality. Seed of the best short-rooted Brunswick chicory would cost about 5s. per lb. in Cape Town."

Salt and Sulphur Lick.

A salt and sulphur lick, 10 parts salt to one sulphur, given to sheep when the first one gets blind and repeated weekly through the summer, will cure and prevent blindness. I have tried it for four or five years.

FARMER.

Does the Spreeuw Eat Grain?

On page 40 Farming Industries of Cape Colony, Professor Wallace says—"The spreeuw is most destructive of fruit, and also of grain crops." Has any farmer in South Africa ever seen a spreeuw eat grain?

FARMER.

Insect Eggs in Peach Twigs.

I forward you a packet containing two lots of peach cuttings.

The one lot is much perforated by some kind of borer, which you will find embedded in the pith in a dormant state. When active the borer is a worm about the thickness of wire worm in sheep.

The other lot of cuttings shows dark patches on the bark and some show boring, others do not.

My peach trees are all ages, and those most affected about ten years old and downwards. The borers do not seem to attack all kinds of peach and are worse in some parts of my garden.

Can you tell me what the two troubles are and the best remedy ?

W.B.C.

Altyre, Burghersdorp, 18th June, 1902.

The supposed "borer" turns out to be the egg of an orthopterous insect or, in more intelligible words to the average reader, of some insect allied to locusts and grasshoppers. Cicadas lay their eggs, too, in such a manner, but their eggs are smaller and many more are deposited at a time. The present eggs are cream-coloured, shining, sausage-shaped, an eighth of an inch long and about one-fourth as wide, and are laid in the pith of the season's growth of wood singly or from two to five side by side in the excavation. The insect in egg-laying evidently straddles the twig, facing outwardly, and bores a hole straight in at first and then curving backward along the pith for nearly a quarter inch. An oval dead spot, quite conspicuous against the natural colour of the bark, marks the entrance to these egg holes. All the spots appear to be on the underside of the twigs, and some twigs bear long rows of them spaced about half an inch apart. I do not know the parent insect, but suspect it to be a large, green, leaf-eating, so-called "grasshopper." The correspondent and others whose trees are similarly injured might be on the lookout for such an insect during the coming spring and summer and let us know what is found. In past years several correspondents have complained of twigs being bored this way, but I have not been so fortunate yet as to see the injury in an orchard myself. A somewhat similar trouble is occasionally reported by Western Province vine growers. The insects will doubtless leave the twigs when they hatch from the eggs. I do not understand what is meant in the letter by the borer being a worm when active, but perhaps quite a distinct creature that had taken up its abode in deserted egg holes was the subject of this observation. The remedy naturally is to cut off and burn the affected twigs.

I can make nothing out of the apparent injury to the second lot of cuttings. They were dry and shrivelled when they reached here after twelve days' confinement in a paper wrapping, but even if they were fresh I doubt that a proper diagnosis could be made except in the orchard. Discoloured patches and breaks on the bark of young

wood may arise from a wide variety of causes. It might be well to submit specimens for examination after the growth starts again, sending them in a wood or tin box so that they will keep reasonably fresh.

CHAS. P. LOUNSBURY, Govt. Entomologist.

Manures and Lime for Citrus Trees.

Will you kindly inform me as to the best manure for orange trees, also as to whether lime or bonemeal dug in between the trees would be beneficial. The soil is heavy black loam. Would lime act as a fertilizer, and is it a good manure for potatoes?

PROGRESS.

On soils such as correspondent describes I should prefer well-rotted stable or farmyard manure to any other for citrus trees. In addition to its acting as a fertilizer it will assist in breaking up and aerating the heavy black loamy soil he describes. The dung should not be dug in around and between the trees with a spade, but merely forked in lightly, so as not to injure the delicate feeding roots of the tree which are so near the surface of the soil. The rain will carry the plant food into the soil. A light dressing of bone meal and lime is beneficial, but well-rotted farmyard manure is better.

When the soil is composed of heavy clay loam, lime forked into it will break up the ground and render it more friable for the tubers. An analysis of the soil will show whether the lime is necessary as a plant food.

E.P.

I see by your issue of June 5th that Mr. G. A. Hoerle, the gentleman who came out here last November from America to buy Angora goats, has had something to say about us and the country.

He says "he regards the climate and soil of South Africa as unfavourable to the growth of mohair, &c., &c." "He thinks, also, the registry system of the South African Association too rigid."

Mr. Hoerle puts me in mind of a good many more who have come from other parts to this country; they jump into a railway and run round for a few days, sum up the whole thing and know all the country and the people.

I met Mr. Hoerle in Uitenhage soon after he arrived and learned that he had come to buy some of our goats, and of course invited him to my farm. That is the only time I saw him, but from my neighbours I heard that he ran up to Mr. Biggs of Wellfound, from there to Mr. Edwards, Klipfontein, and Mr. Holmes, all practically in the same district. From there he returned by another route, calling at my son's and Mr. Cawood's farms, both on the line of railway. From the latter of these gentlemen I learned that he wanted to buy goats here,

wanted them for a low price, and they quite came to the conclusion that he was not prepared to buy what we amongst ourselves often give for a decent goat.

Now how he could have learned what he says he did in the time, and how he could have "secured representatives of the 'best' flocks" under the circumstances, I fail to see. I am pleased to see, though, that he thinks "our registry system is too rigid," better so than too lax.

If Mr. Hoerle or anyone else from other parts wishes to come and buy goats, I think he will find it to his interest to spend a little time among the Angora farmers, who he will find are willing to entertain him and take him from one farm to another that he may have an opportunity of fully informing himself, then he will be in a better position to report upon the South African goats and farmers. We don't like people to come here and sum us up in five minutes. We are trying to improve our goats and the country too, and are quite prepared to be well examined, and criticised too if you like, but object to be condemned without a fair trial.

I am, etc.,

C. LEE, SENR.,

President S. A. Goat Breeders' Association.

Clairmont, Klipplaat, July 2nd, 1902.

Sore Teats.

In answer to Mr. P. J. Hugo's enquiry re sore teats of cows, I beg to state that I know of no better remedy and a surer cure than the application of pure cream. Nothing salt should be used in any case. The teats must be cleansed with hot water.

P. A. S.

Malmesbury, 6th July, 1902.

In your *Journal* of the 22nd ulto. there are some remarks on the use of millet hay as ensilage.

In this neighbourhood farmers are quite divided in opinion as to its merits as fodder. Some condemn its use strongly, while others profess to use it freely without finding any injurious effects.

Under the circumstances perhaps the enclosed extract from a Kansas agricultural report will be interesting to many of your readers.

OBSERVER.

Grahamstown, 18th June, 1902.

Himbaush, Veterinarian, North Dakota:—Experiments in feeding on millet hay demonstrated that when used entirely as a coarse food it is injurious to horses:—

- 1st, In producing an increased action of the kidneys ;
- 2nd, In causing lameness and swelling of the joints ;
- 3rd, In producing infusion of blood into the joints ;
- 4th, In destroying the texture of the bone, rendering it softer and less tenacious, so that traction causes the ligaments and muscles to be torn loose.

Nothing unfavourable to the use of millet hay for cattle or sheep feeding has been reported.

Rotary Dutchman Disc Plough

Messrs. Malcomess & Co., East London, have sent us the following points about this plough :—

It will work satisfactorily in the hardest and driest of soils, so hard, indeed, that a mould-board plough is absolutely useless.

It will cut and turn a perfect furrow, of even depth and width, leaving the ground thoroughly pulverised, and so even that the furrows cannot be counted.

It is made to last a lifetime, and is worked at far less expense than any other.

It can be worked by any ordinary farm hand who can drive a team and oil the bearings.

It will not choke in thick weeds or get fast under roots or rocks. It rolls right along and makes more distance, while cutting more furrows, than any other plough.

It stands alone as being the best plough for sticky ground.

There are no stoppages, or waste of time cleaning discs, and no delay for sharpening shares or points, and no blacksmith's bills.

It pivots on the land wheel and will turn a square corner without the ploughman touching a lever. It will work on the steepest hillside.

It does not press on the bottom of the furrow, as does a mould-board plough, but leaves the furrow bottom loose, and there is none of the glaze on the overturned earth so common with the old-style ploughs.

For breaking up new lands, filled with weeds and roots, it has no equal. It cuts everything before it and turns it under.

One horse to the furrow and one man to the plough, no matter how many furrows it is cutting.

Better crops result from the use of this plough. The ground is so thoroughly pulverised, and the bottom so open, that the roots of the crops can penetrate the soil more easily.

We shall be glad if you will kindly give publicity to this letter (for the length of which we must apologise), as we feel sure that it will be of interest to a large number of your readers, and thanking you in anticipation of your courtesy in the matter.

AGRICULTURE.

Oat Smut in Wisconsin—Prevalence and Method of Eradication.

The following account of experiments and observations in regard to the presence of smut in oats, and the treatment adopted for its prevention, is taken from Bulletin No. 91 of the University of Wisconsin Agricultural Experiment Station. Letters from farmers who have tried the formaldehyde treatment to prevent oat smut reported most favourably on its use as a preventive:—

The smut in grains had become a great source of annoyance to the farmers of Wisconsin, greatly reducing the yields of the various crops of cereals and contaminating the seed grain that was to be used for future crops. This bulletin will deal particularly with the oat smut, although the treatment described for the seed oats will also eradicate barley smut and loose smut on wheat. From observations and determinations made during the past three years the writer is led to believe that oat smut is prevalent in all parts of the State, and is increasing at such a rapid rate that unless active measures are taken for its eradication the time is not far distant when the farmer will find it unprofitable to raise that important cereal.

To determine the natural increase in smut, a sample of Daubenny oats, Wisconsin No. 2, that was affected to the extent of ten per cent. in 1899, was sown without treatment the following year, and by careful count twenty per cent. of the crop was found to be affected. Seed was again retained and sown without treatment last season, and several counts showed the crop to be affected to the extent of thirty-one per cent.

Cause of smut.—Smut is caused by fungous parasites that grow within the grain plant, eventually destroying the seed of the affected plant and contaminating the seed of the healthy plants by the scattering of spores largely during the ripening period of the grain. The dust-like spores when dry are readily blown to adjoining plants, or coming in direct contact with healthy ones, inoculate their neighbours, which in return continue to propagate the species. The smut spores do not live over the winter in the ground, but are killed through frost or inclement weather. The smut affecting the crop lives during the winter as spores on the seed grain and begin their deadly work shortly after the seed is sown.

The affected oat plant makes a sickly growth and generally heads lower and somewhat later in the season than the healthy plants; therefore, the extent of damage to the crop is not noticeable by casual observation. It is largely due to these facts that smut has been able to invade the oat fields of the State unnoticed by the farmer until it has gained its present strong foothold.

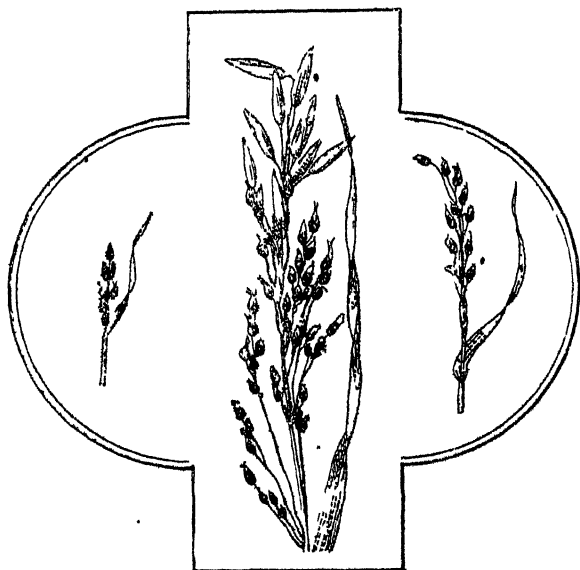


Fig. 1.—Heads of oats affected with smut in different degrees.

Trials with formaldehyde solutions of different strengths for the prevention of oat smut.—Several experiments were carried out during 1901 to note the most effective strength of a solution to be used and the length of time the oats should be submerged to eradicate smut. The oats used for these trials were retained from a plot that had been affected with smut the previous year to the extent of twenty per cent. The several trials show that the length of time the oats are submerged and the strength of the solution are very important factors to be considered. It is essential that the treatment be entirely effective so as to prevent inoculation of the oat crop by a few smutty heads which are sure to appear if the treatment is not perfect. When once done effectively it may be several years before another treatment is necessary.

From tests made on oats that were affected with the smut, the formaldehyde treatment has been found entirely effective when oats were submerged for twenty minutes in a solution made of one pound of formaldehyde and fifty gallons of water, no smutty heads being found at any time during the growing period of the oats.

Oats that were submerged for less than twenty minutes or where the solution was weaker than the standard recommended (one pound of formaldehyde to 50 gallons of water), produced smutty heads, varying in amount from one to twenty per cent.

HOW TO TREAT SEED OATS TO PREVENT SMUT.

If 50 bushels of seed oats are to be treated, secure from a drug store one pound or a pint of formaldehyde (sometimes called



Fig. 2—Result of test on the plot where the seed oats were not treated to prevent smut.— *a*, Not affected with smut; *b*, Affected with smut. The two bundles contained 925 stalks, of which 286 heads, or 31 per cent, were affected with smut. The smaller bundle represents the smutted oats selected from the total number of stalks cut, and the larger the unaffected oats remaining.

formalin). Speak to your druggist in advance so that he [may secure the formaldehyde in time, if he does not have it on hand. Put into a barrel or cask 50 gallons of water and pour in the one pound of formaldehyde liquid to make the proper solution. Dip out about one-half of the solution into another cask in order to treat two sacks of oats at the same time, thus facilitating the work. Place about two bushels of oats in each of two gunny sacks or large bags and submerge the oats in the solution for twenty minutes; then lift the sacks from the cask and let drain for a minute or two so as to save solution. Empty the oats on a threshing floor or on a canvas to dry and proceed as before, using the same sacks for the remainder of the oats.

The solution as used is not poisonous and will not injure the sacks or clothing coming in contact with it. Formaldehyde is a gas generated by burning wood alcohol. It is readily soluble in water, which will hold 40 per cent. of it in solution. This solution is sold by most drug stores under the name of formaldehyde or formalin at about 50 cents per pound.

It is well to treat the seed oats two or three days before sowing to

give ample time to dry. If the oats are shovelled over a few times it will facilitate the drying very much and no difficulty will be experienced sowing with seeder or drill. The treated oats can be sown with a force-feed drill or seeder when quite damp, but the machine should be set so that it will indicate sowing about a peck more than the quantity desired per acre, as the oats are swollen and will not run quite as freely as dry oats.

The treatment of seed oats seems to facilitate the sprouting; a difference of from two to four days in favour of the oats treated will be noticeable. From the field tests made at the University farm by the writer no detrimental effects on the germination of seed were detected.

Awnless Brome Grass (*Bromus inermis*).

The appended copies of correspondence on cultural experiments with Awnless Brome Grass are reproduced for the information of those of our readers who are interested in the subject. We may add that a further quantity of seed will in due course be obtained for distribution, when the usual notification will be given:—

Government Experimental Farm,
Cala, 24th October, 1901.

SIR,

With regard to my letter to you on this subject on July 22nd last, when I promised to report further on my observations of this grass, I have now to say that further experience confirms me in the opinion I formerly expressed, viz., that the grass is best sown here in winter. The small bed which I sowed on July 13th and which I referred to on July 22nd, has come through the winter very well. The frosts have not injured the grass, though the first frosts found it very young and tender. Not one per cent. has been lost. It makes large stools and is in a generally satisfactory state.

With regard to the 1lb. bag I received on August 10th, I sowed three patches of land containing 52 square yards, 98 square yards, and 50 square yards on 19th August, 6th September, and 23rd September respectively. The two first lots were sown in drills one foot apart, and the last was sown broadcast. Of the first lot about 80 per cent. was lost. This was due to the prevalence of hot winds and drought. The second lot did well, the loss being very slight, scarcely 3 per cent. It is strong and green, and can stand the strong sun. It is a significant fact that during the very early stages of growth in this patch cool and cloudy days were the general rule and much rain fell. Of the third lot 50 per cent. survives, heat again being plainly the cause of loss. The grass now growing shows a very broad, tender leaf.

The general result of my further observations has been to confirm me in the opinions I expressed in my last report. I may say that I am more than ever convinced that the seed should not be sown in hot climates during summer.

When the grass now growing has run to seed I will communicate with you again.

I may add that I have a small portion of the seed still on hand.

(Sgd). N. J. BEUKES.

The Under Secretary for Agriculture,
Cape Town.

Dominion of Canada,
Department of Agriculture.
Central Experimental Farm,
Ottawa, 17th December, 1901.

MY DEAR SIR,

I have the honour to acknowledge receipt of your letter C.1938.364 referring to Awnless Brome Grass and reporting on the small sample sent to you for trial. I notice that Mr. Beukes lays great stress on the advantage of sowing this grass with you in winter. I have no doubt that this is correct. In this country it gives the best results when sown either very early in spring, or early enough in the autumn for the young plants to have become established before winter sets in. A certain amount of moisture seems necessary to give it a good start. I sincerely trust that this experiment may finally prove to be as successful as to the present time it appears to have been. I shall be much obliged if I may receive a report at some future time on the hay and fodder-giving qualities of this grass in South Africa.

I hope when the seed is ripe that it may be grown in some other places. Possibly some other spots more favourable for its development may yet be found. Here in our North-West and in British Columbia it has been an enormous success, giving heavy crops of hay for two years and excellent pasture for four or five more if not fed too closely. As pasture it has proved to be very succulent and most attractive to all kinds of stock.

(Sgd). J. FLETCHER, Botanist.

The Under Secretary for Agriculture,
Cape Town.

Government Experimental Farm,
Cala, 25th March, 1902.

SIR,

With regard to my letter to you on this subject, dated October 24th last, when I promised to report further on this grass, I have now to say that I have made a further trial sowing on November 23rd, on a plot of 67 square yards extent. It came up nicely, but the intense heat of the sun proved its destruction, surely, completely and rapidly.

In connection with the beds of 50 square yards which I sowed on September 23rd last (see letter B.2490.364 dated 24th October, 1901) I regret to record that locusts visited the Station on the 12th and 14th January last and completely cleared off the young grass. As I had only the native "boy" to assist me I was not able to take adequate measures to save the crop. When the young shoots again appeared a prolonged drought prevailed which I may remark, in passing, also destroyed most of our common maize. This is now in a poor condition and no detailed report of interest is possible.

Of the seed sown on August 19th last, 80 per cent. perished owing to the intense solar heat. The remainder stood well, much better than the other, owing to its being so thin. Much leaf but scarce in seed is a summary of the appearance. Small wingless grasshoppers did great damage to the seed. The average length of the blade is one foot, and the seed grass itself is two feet above ground.

Another plot of 98 square yards has thriven well. The loss is about 3 per cent. from heat, etc. Hence the grass is thick. The remarks upon the last-mentioned plot apply here also. These plots I may remark were the only green spots on the Station. Length of blade 1ft. to 1ft. 6in. Height 2ft. to 2ft. 6in.

Regarding the bed I sowed on July 13th last, measuring 3ft. by 8ft. 6in., I may say it has done well. I have carried water for it as frequently as possible, but I have not been able to do this regularly as I have often had no more than one "boy" on the Station for my sole aid.

I cleared off the bottom leaves and the grass ran up into seed. I cut it on March the 3rd, and it grew out again, being now 9in. high. The result is 3½lb. dry hay, and half a pound of seed which I thrashed out.

The grass gives me satisfaction and not a little surprise. When I view the devastation caused by the drought in respect of other crops, I wonder how the grass survived at all.

I used a small quantity, both of green and dry, as a test on a horse. The animal, I am pleased to say, greatly liked it. This confirms Mr. Fletcher's view.

In pursuance of my former remarks on what appears to me the best time for sowing, I will now say that I regard it practically impossible to sow in winter in such districts as the high veld of Barkly East district or Stormberg. The frost there is extremely severe. You will observe that writing on the 24th October last I said "the seed should not be sown in *hot* climates during summer." Of course, there are really many climates in this large country. Some little discretion in regard to local circumstances may be necessary. Mr. Fletcher appears to think that I would have the grass sown everywhere in South Africa in winter. This certainly was not the impression I intended to convey.

But my opinion coincides with that of Mr. Fletcher, viz., that it should be sown in a *cool* season, e.g., spring or autumn.

Loss by solar heat only seems to occur when the grass is very young. After about a month it seems able to hold its own. As to its vital power, I may say that I cut a stool of it when green and in 24 hours it grew out again, one inch! I supplied it with copious moisture. Nor have I any reason to suppose this stool one in any way out of the common.

The grass is strongly rooted and not likely to be uprooted by animals. In connection with this aspect of the matter and generally with what preceded, it may be of interest to state that the grass I referred to in my letter of 22nd July last as growing in the shade of a tree has been transplanted by me to a site nearer water, and in other respects, better also. It thrives well, and in November last when my boy ignorantly and accidentally uprooted a stool, leaving only a few roots and shoots in the ground, the grass grew out again, and the stool is now 20 inches across where the new shoots spring from ground (not the total breadth) and is still growing.

There seems no doubt that in future a very excellent winter provision could be secured from this grass.

I regret to say that as I have to leave the Station at the end of the month I fear I shall not be in a position to give you the final results of the patch here. It is of course not yet fit for cutting.

I append a summary table of my operations in this matter.

(Sgd). N. J. BEUKES, Supt.

Date of Sowing.	Date of Reaping.	Seed sown.	Sown (Area)	Est. Loss.	Results.	Appearance
1901.	1902.			Per cent.	lb. lb.	
July 13	March 3	About 1 Tablespoonful	3ft x 8ft. 6in	..	3½ hay } seed	..
August 19	..	2½ oz.	12 sq yds	80	..	Healthy
Sept. 6	..	6 oz.	98 sq yds.	3	..	Healthy
Sept. 23	..	3 oz.	50 sq. yds	50	..	Poor
Nov. 23	..	4½ oz.	67 sq yds.	All	..	..

Government Experimental Farm,
Cala, 31st March, 1902.

SIR,

I have pleasure in stating that I have now cut here the plot of 98 square yards of Awnless Brome Grass, and with a most satisfactory result. The weight of the grass (dry hay) was 102lb. The grass was cut on the 29th instant and is already two inches long.

(Sgd). N. J. BEUKES.

The Under Secretary for Agriculture,
Cape Town.

Prospect Farm, near Komgha,
18th May, 1902.

SIR,

I have the honour to acknowledge receipt of your letter of the 14th instant with reference to the Brome Grass seed supplied to me in August last.

The 1 lb. seed retained by myself was sown about the middle of September, germinating well, and has up to the present time made very fair growth. I have made two cuttings from the plot, using the green forage for my horses, which they appeared much to appreciate. At the present time the grass stands from 4 to 6 inches high, but our dry season now having set in I fear it will not make much more growth until rain falls.

From my experience of the grass for the past two seasons I am of opinion that the habit of the grass is of rather too dwarf a nature to be of much value for haymaking, but for feeding off by stock I have formed a very high opinion of its value, so much so that I have recently received from America 50 lb. of the seed, which I propose sowing in the spring.

I may mention that the plot of grass under observation has been cultivated and kept quite free of weed or other growths. Under ordinary conditions I do not think it will grow even as tall as this.

(Sgd.) H. G. FLANAGAN.

The Under Secretary for Agriculture,
Cape Town.

Carnarvon Farm, P. O. Sterkstroom,
20th May, 1902.

SIR,

We have the honour to acknowledge receipt of your letter of the 14th instant, and much regret to state in reply that all the grass we sowed has died from the severe drought. We have had and are still having practically no rain for months.

(Sgd.) HALSE BROS.

The Under Secretary for Agriculture,
Cape Town.

Komgha, 14th June, 1902.

SIR,

With reference to the Awnless Brome Grass seed supplied to me through Mr. Flanagan, I have the honour to inform you that I sowed it early in November last on a new piece of ground, specially prepared for it; unfortunately it remained very dry for some time after sowing, but later we had a nice shower of rain which brought it up. It grew splendidly until it got about four inches high; it was then attacked by a very small black grub, which almost exterminated it. The little that is remaining is kept down by wild buck,

showing that it must be a very palatable grass. I also had a large field of young lucerne destroyed at the same time by the same grub.

(Sgd.) J. B. SPARKS.

The Under Secretary for Agriculture,
Cape Town.

Report on Van Wyk's Vlei Estate for the Year 1901.

The appended report on Van Wyk's Vlei Estate for the year 1901 is published for the information of our readers:—

With the dark clouds of war overhanging everything at the opening of the year, everything connected with the Estate appeared very gloomy. Our only thoughts were of the near approach of the enemy and how to remove to a place of safety the harvest of the previous year. In this we were only partly successful, as in spite of every effort to effect its removal a considerable quantity of corn, chaff, &c., fell into the hands of the enemy, who during the month of February under Hertzog and other Boer leaders occupied the village.

Subsequently as the wave of invasion receded, and no prospect of the Boers returning in force being entertained, a number of residents, taking heart of grace, contrived to obtain sufficient corn to cultivate a few of the blocks, and two hundred and twelve (212) morgen were placed under cultivation. With the plentiful supply of water stored and nice rains, the crop grew splendidly and our prospects appeared to brighten considerably, and a good harvest was looked forward to.

The peaceful progress of events was, however, interrupted by the arrival on the morning of the 28th August of a small party of men under a rebel, named Van Wyk, who after looting a few articles concluded their visit with the setting fire to and burning down of our public buildings.

As all the records of the Estate were kept there, nearly the whole of them were destroyed with the building; a serious matter, as the majority of them cannot be replaced.

A few days after this, a commando under Van Reenen arrived, and it consequently became necessary to destroy the standing crops, in order to prevent them, as they ripened, falling into the hands of later patrols and commandos.

The crops were removed at the beginning of October and proved a prudent and necessary measure, as during the following months, especially in December, numerous parties visited the Estate and neighbouring farms.

In consequence of these occurrences, there is nothing to report as to harvesting results: the gardens have not produced anything to speak of; a few vegetables, pumpkins and melons are still coming on.

A severe drought appears to have set in, but may be expected to break with the rains usually falling in March.

A considerable quantity of salt is ready to be collected, but as its storage on the Estate means keeping a supply for the enemy, its collection is not being proceeded with.

Dam—in good order; water at tower on the 31st December, 1901, was 8 feet 4 inches.

Furrows—distributing and garden; both in good order, require some cleaning.

Rainfall—9·44 inches.

Revenue—£800 15s. 8d.

Expenditure—£370 6s. 10d.

CHAS. C. McMILLAN, Bailiff.

Carnarvon, 20th February, 1902.

STOCK FARMING.

The Selection of Breeding Cattle.

We are indebted to Mr. W. G. Mason, Principal of the Government Agricultural School, Elsenberg, for the following article on the above subject:—

Darwin has said that “not one man in a thousand has accuracy of eye and judgment sufficient to become an eminent breeder. If gifted with these qualities and he studies the subject for years and devotes his lifetime to it, with indomitable perseverance, he will succeed and make great improvements, and if he wants any of these qualities he will assuredly fail.” The two faculties on which Darwin lays particular stress are those of observation and judgment, and he insists on the progressive development of these gifts by long continued and arduous practice. No one doubts the truth of such a statement; but at the same time it may not be amiss to recognize that accuracy of observation must depend upon a knowledge of what to look for, and sound judgment must be limited by the ideal of perfection which a breeder carries in his mind.

General ideas as to what an animal should be like are the common property of almost every breeder of stock, but it is only the few who have ever seriously enquired what a typical specimen ought to be like, and it is a still fewer who have sought to fathom the problem as to how far an animal's form gives a true indication of its qualities and capabilities. Experience teaches us that a careful inspection

of the outward form gives us quite a sufficient guide for the selection and purchase of our breeding stock, and the only difficulty which presents itself is in being able to give a true interpretation of the result of the examination. A good judge of cattle must not be content to merely distinguish between a beef-producer and a dairy cow, but his aim should be to fix the exact degree of utility of an animal for the purpose for which it is intended.

In forming any conclusion as to the merits of any animal it should always be remembered that the farmer does not primarily keep stock for pleasure but in order that he may make a profit from them, and, in consequence, we ought never to allow mere gracefulness of form to blind us to a want of general utility. A person who buys a horse on account of its small delicate head, its arched neck and its flowing mane is not going to make a fortune in farming, but the man who insists, as a first essential, on sound and correctly formed feet and limbs, has already climbed one step in the ladder of success. There is, however, in our very best animals a well-nigh indescribable charm which we speak of as "quality," and which consists in nothing more than in the presence of everything necessary to usefulness and in the absence of everything unessential to it, which, if present, would tend to make the animal gross. So far then as beauty consists in the absence of superfluity and redundancy it must be looked upon as being most desirable, but the breeder would be well advised who refused to consider that the sole or chief aim of his work was to appeal to the artistic eye.

Though perfection should be our goal, still, in order to avoid continual disappointment, it is perhaps well to realize that it is nigh impossible to obtain a really typical specimen, and the production of a good animal, which may be defined in the words which Fitzwygram uses to describe a good horse as "one with many good, few indifferent and no bad points," should find us well satisfied with ourselves. One markedly bad point must be considered quite sufficient to disqualify an animal for breeding purposes, and we ought never to allow any exceptional merit in one direction to outweigh a bad fault in another, for the latter is just as sure to be reproduced in the offspring as is the former.

Leaving out of account all considerations as to the suitability for adaptation to surrounding conditions, the special characteristics of different breeds and the requirements of any particular market—all of which are worth more than a passing thought—we propose to proceed to the broad principles which underlie the selection of all breeding cattle.

The first essential to success in stock farming is that attention should primarily be directed to the choice of animals possessed of a *sound constitution*. Not only is it necessary to ascertain that the stock we breed from are in present bodily health, but consideration should be given to the inherited qualities of the race. If our original purchases should happen to have been deficient in robustness we will find that our herd will suffer unduly from any inclement or trying

weather; that they will not readily adapt themselves to change of conditions; that they will be more liable to suffer from disease; that they will not readily recuperate after sickness, and that they will not be such sure breeders as would have been the case with handier stock.

There are characteristics without which an animal is rarely possessed of a good constitution, but it need not necessarily follow that all animals possessed of these qualifications are strong and healthy. The system of high feeding and close confinement now practised in many countries has done much to undermine the vigour and recuperative power of our best herds, and it may safely be said that for general farming it is better to select from those animals which are known to have been reared under natural conditions than from those which have been brought up under highly artificial treatment.

The following are some of the chief indications of a good constitution :—

- (a) A deep set, thick and compact body standing on short legs.
- (b) Head short rather than long.
- (c) Nostrils wide and open, indicating lung power.
- (d) Neck short and thick.
- (e) Deep and wide through the region of the heart, with a broad breast and wide brisket.
- (f) Well sprung and long hooped ribs.
- (g) Straight strong back, and broad, strong and muscular loins.
- (h) A full clear eye.
- (i) Activity in movement, indicating bodily health.
- (j) Capacious barrel, indicating a large consumption of food and vigorous digestive power.

As the male is, or ought to be, the more vigorous animal, it is to the bull that we look for the greatest development of these characteristics; whilst in the female we expect to find all evidences of constitution which are consistent with feminine form.

Dairy cattle might almost be looked upon as an exception to the rule, as their shape is scarcely consistent with our ideas of hardy animals; but it must at once be acknowledged that, as a rule, our best milking breeds require careful handling during times of cold and rainy weather. In fact the production of milk in large quantities is not a natural but an artificial accomplishment, and in so far as we exceed nature, we must be prepared, if we would maintain the inherited property to its full extent, to make some reparation by extra care.

There is a prevalent idea that a bull cannot be of good milking strain and yet possess a distinctive masculine appearance, and we not infrequently hear that a narrow head, fine horn and thin neck are to be sought in selecting a male for a dairy herd. These characters denote the lack of constitutional vigour and are as undesirable in this class of animal as in any other, and give no indication of ability to beget milkers.

Extreme development of masculine character in a female should likewise be viewed with a similar disfavour to that of femininity in a bull, for it will be found that such cattle are very uncertain breeders.

Pedigree is another point that should be considered. Not one man in a thousand can afford the expense which would be necessary in order to start with a herd of pure-bred cattle, and even if the capital were available it is by no means certain that it would be advisable for him to do so. It cannot too often be repeated that the bull is half the herd, and that it is only by a judicious system of weeding out and by the purchase of good bulls that we can hope to bring about any great improvement in our herds. The male should always be selected with the greatest care, and he should be of a pure breed, so that he may with the greater certainty transmit his good qualities to his progeny. To those who have the patience and can afford to wait McCombie's advice is good. He says: "I hold that every bull must be tested, and when the result is found satisfactory, *then, and not till then*, use him indiscriminately for all your cows." And again he says: "If the result be satisfactory money should be no temptation; he must not be sold."

From amongst the various breeds of cattle we can distinguish two extreme types—the beef and the milk, and midway between these we find what is now described as the dual-purpose cow.

The beef type is characterized by a parallelogrammatic form, stout and deep, with little daylight underneath; the shape of the head in correlation with the body is likewise short and broad; the eyes are large and placid with no signs of nervousness, the ears are large but not coarse; the neck is broad and stout with no tendency to depression; the throat is clean and fine and the neck rapidly broadens out towards the breast; the brisket is wide; the shoulders are placed well back but not too tight at the top so as to allow of filling out when fat; the girth should be large with a full fore flank and ribs well sprung; the line of the back must be straight, though a slight rising would be admissible; the loins must be broad, level with the back, and strong; the hips must not be prominent or coarse; the hind quarters should be wide, long, and ending broad behind; the thigh should be full and the flesh extending well down to the hock; the underline should be straight or swollen out in the region of the abdomen; the legs should be set on straight and the bone fine; the hair should be soft and fine; and the skin should handle well, *i.e.*, should be loose over the ribs, soft, and not too thick or thin.

In a beef herd what we want to produce are animals which will come early to maturity, yield as small a proportion of offal as possible, give a good percentage of meat to bone, and will carry a large amount of flesh in the most valuable parts.

For early maturity we are largely dependent upon breed, though much can be done by a judicious selection of those animals showing a distinct aptitude in this direction. A good thriver will possess most of the qualities stated in the description of our beef type, and the bad thriver may usually be told by its narrow face, long low neck,

deficient loin, thick and trousery legs and tail, shallow chest, harsh hair and thick skin. The ox which yields a large proportion of offal is usually the one which gives the greatest proportion of bone. It will be found to lack quality and to be possessed of coarse prominent bone, a rough heavy frame, coarse joints, and it will handle badly.

The parts of the body which are of greatest value are the upper portion of the ribs, the loin, the quarters and the thighs, and it must consequently follow that the more flesh we can place on these regions the more our animals will be worth, and hence the importance will appear of selecting our frames to carry flesh on what will be the most valuable cuts. The head, neck, brisket, and the lower portion of the carcass are of least consideration to the butcher.

The female dairy type tends to assume a wedge shape, being heavy behind and light in the fore quarter; she should have a lean appearance over every portion of her body, and especially so during her milking period; she is an animal of high organization and has a much more alert and resolute appearance than the beef type. The handling is of great importance; the skin should be elastic, fine, without flesh but not papery; oily, and around the eyes, on the inside of the ears, at the tail head and on the thighs it will usually be of a yellowish colour; the hair fine, soft and glossy; the head lean and fine; the neck thin and joining on to lean shoulders; the back straight with well-hooped ribs; the belly large; the loin broad; the hips far apart and prominent; the hind quarters lean with a distinct depression between the hip bone and the tail head, and either straight or rising upwards; the tail fine and thin; the thighs thin and curving inwards from the tail head downwards; a well set on and capacious udder with teats not too small and evenly placed; the milk veins large and branched; bone of fine quality and not excessive; and a general feminine appearance.

It is to be noted that size of udder does not give a reliable gauge of milking capacity, for it may be made up in a great degree of flesh. A good udder should handle like a kid glove, and when emptied of its contents it should collapse.

The escutcheon enables us to judge of a dairy cow's ability to milk. Speaking generally, breadth of that portion on which the hairs turn upwards and outwards shows volume of milk, and extension towards the tail head shows length of milking period.

Dairy bulls are amongst the most difficult of all domestic animals to select; but, as has been stated, they should like all other male animals show distinct indications of masculine character and constitution. It is best that they should be selected on account of the known performances of their parents, and not only should the dams be good milkers, but the sires should be proved getters of dairy flock. The hind quarters of dairy bulls should be of the milk type and there should be no excessive tendency to put on flesh. The escutcheon should indicate milk and the rudimentary teats be well formed and evenly placed.

Dual-purpose cattle are animals which are midway between the dairy and the beef type. In general form they approach the latter though they are not so massive; they are longer in head, neck and limbs; they are not so wide at the withers, and the udder handling and appearance point more to milk.

Mr. Hoerle's South African Observations.

Mr. G. A. Hoerle has returned (says the *Oregon Agriculturist*) from South Africa. A letter from him to Mr. J. B. Stump, of Monmouth, Or., contains many interesting comments on South African breeders of Angoras and the goats of that country.

We quote some extracts from Mr. Hoerle's letter as follows: "I am back from South Africa, but, as you have read in the *Oregon Agriculturist*, without goats. Our Government holds that as goats are only slightly affected by rinderpest one might have it in so mild a form that nobody could detect the disease, and thus give it to one of the others during the journey. I brought a letter from Dr. Hutcheon (Colonial Veterinary Surgeon for Cape Colony) explaining that after two weeks there is absolutely no danger. He also said that the Angora can only get the disease through inoculation and has never been known to take it running on the veld with cattle. Furthermore, except a few work oxen and milch cows, there are no cattle in the Angora district as they have all been taken by the military. I hope I can ship the Angoras in some way, but may have to wait until the war is over. Whenever I succeed in making the shipment I will with pleasure bring over your buck from Mr. Holmes.

Among the animals I selected are some which on veld raising, with no feeding whatsoever, have clipped as yearlings 15 to 18 months old, and a growth of hair of nine months and 26 days, fleeces which weighed from 10 to 12½ pounds as good as 12 to 14 pounds at 12 months growth.

The staple of these animals was from 10 to 12 inches.

I compliment you on the beautiful kid which I have seen illustrated in the *Oregon Agriculturist*. That 8½ pounds of mohair, if not a misprint (no misprint), would beat South Africa. I suggest you name him 'Oregon Wonder.' I bought 11 kids which I had clipped in January. They were born between August 1 and October 1 and clipped 31 pounds, but I doubt whether there is one among them that would fill up to 8½ pounds. They might if they were properly kept when weaned, but most of the South African goats get stunted at that time.

I see that there are only 1,500 registered Angoras in Oregon out of a total of 30,000 in the Kansas City registry. I may have too

high an opinion of your skill, but I believe you men in Oregon could put more Angoras in the South African registry than all the rest of the United States.

Mr. Williamson complains of my considering the South African standard 'too high.' He quoted from the *American Angora*, which did not publish all I said in my letter, as Mr. Williamson himself has done at times. I am in favour of a graduated registry, the highest classes of which cannot be too high to suit me. In South Africa a registered buck goes in three figures. That is all right for the wealthy, who can afford to start the bidding at \$500, but who takes care of the poor devils who cannot afford to bid more than \$15 to \$25? Why not give them as well as the rich a chance to know what they are getting?

In South Africa it is less important. The best breeders are so well known that you do not run much risk. Most breeders have from 200 to 300 which they call thoroughbreds. These are culled every year, and the culls thrown back into what they call their 'general' flock. Some of these 'general' flocks are as much thoroughbred as their best goats. The only difference is that expensive bucks only are used with the top flocks, and sometimes to the regret of the breeder. I have seen in at least one breeder's mutton flock animals that outclassed the best product of his 'buck flock.' In spite of all, new blood is the rule for the best breeders. One of them said: 'As soon as a breeder thinks he is the only one who can raise bucks, he is lost.' During 1898 and 1899 not one of the breeders who had a great reputation ten and fifteen years ago got a prize at the Port Elizabeth show.

I saw a number of does with no beard, mohair down to the hoof, even on the front legs, around the eyes, and even the point of the tail was pure mohair. But don't say 'sell.' However, these does were all small, some of them too small for registration.

One farmer told me the evenness of his flock was due to the fact that he never has more than one buck at a time for his thoroughbred flock, and changes every year. He had the best average I have seen, and the smallest percentage of his goats which passed the first examination were rejected at the third.

As soon as I get leisure I shall set to work on a new Angora book. My stay in Cape Colony has given me plenty of new views and experiences which are worth while bringing to the notice of American breeders."

Report of the Chief Inspector of Sheep for the Year 1901.
(ACTS 20 OF 1894 AND 28 OF 1899.)

The following is the Annual Report of the Chief Inspector of Sheep for the year 1901 :—

I regret that the unsettled state of the country is again responsible for an unfavourable report upon the working of the Scab Acts; and that another twelve months have passed without any progress being made toward the eradication of scab.

In some few districts, it is true, we have managed to maintain the ground already gained; but in by far the larger part of the Colony there has been a retrograde movement, which means a great increase in the number of infected flocks. In other words, an entirely fresh start will be necessary when the country has been thoroughly pacified.

During the greater part of the year out of the staff of 167 Sheep Inspectors usually employed, not more than 70 have been able to do any work worth mentioning. Even these men have not been entirely exempt from the many drawbacks incidental to war, and which naturally follow the enforcement of Martial Law Regulations, for at times their regular duties have suffered severely. The enforced suspension of systematic inspection tours has proved most unfortunate, and hampered severely the work of cleansing the stock.

Several of the Inspectors have been dismissed owing to acts of high treason and open disloyalty; others have voluntarily resigned; and many who were prevented from continuing their duties have joined the local defence forces and have been engaged in the work of clearing and protecting the borders of their districts from the incursions of bands of thieves and marauders.

In the northern divisions, especially in those bordering on the Orange River Colony, most of the temporary Inspectors mentioned in my last report have been compelled to abandon their work altogether; some were deprived of their horses, whilst others were prevented by roving bands of rebels from carrying on their inspection duties.

In the north-western and central districts no work whatever has been possible, and thus owing to all cleansing restrictions being in abeyance, together with the difficulty experienced in obtaining dip, the scab insect has reigned supreme, with a free and practically unlimited run.

In 18 divisions of the Colony the interruptions have only been of a slight nature, although quite sufficient to prevent any good work being accomplished. The main efforts of the Inspectors being diverted to the protection of their areas from the introduction of infected stock, and to keeping the disease in check as much as possible.

Owing to reasons already mentioned, my usual visits to different parts of the Colony have been stopped, and the periodical tours of

my assistants have been very much interfered with, and in most parts entirely prevented.

The simultaneous dipping which should have been carried out in the early part of the year was cancelled, on account of Martial Law having been enforced throughout the Colony, the difficulties of transport, and other weighty reasons. This action, although it may have caused discontent among a certain class of the farming population, has been fully justified, for as events proved it would have been an impossibility to have carried out the dipping, excepting in a very small part of the country. Had the gratis dip (a large portion of which was purchased before the close of last year) been sent to the depots, the distribution among the farmers could never have been effected, and the storage of large quantities of dip at outlying depots would only have resulted in waste and loss of material. It is sincerely to be hoped that when attempts are again made at scab legislation, the experience already gained will prevent a repetition of the too generous treatment meted out to farmers in the past.

I have already shown that in the majority of the districts sheep inspectors were for various reasons prevented from performing their usual duties. This cessation of work very soon raised an important point, namely, the removal of slaughter stock to the line of rail.

In order to cope with this difficulty, and to facilitate the entraining of sheep intended for the butcher, dipping supervisors were appointed at some of the most important stations, namely:—De Aar, Beaufort West, Victoria Road, Houtkraal, Cradock and Naauwpoort: the duties of these men being to examine, and when necessary dip, any flocks passing through, or sent by rail from these stations to different parts of the Colony. As far as possible every effort has been made to check the spread of scab, and confine the disease within reasonable limits, so that when the country resumes its normal condition the stock in certain parts of the Colony will, I trust, prove to be in a fairly healthy state.

At one time very serious inconvenience was occasioned owing to the large sale of sheep captured in the conquered territories. Many thousands of small stock in a most deplorable condition owing to the ravages of scab, were sold to speculators at Aliwal North, and as the local appliances were wholly unfit to cope with the proper treatment of these flocks certain relaxations had to be made. In spite of every precaution, many of the purchasers managed to evade the regulations and removed their stock into some of the healthiest districts of the Eastern Province. These introductions were productive of the worst results, scab was spread about the country, and outbreaks of the disease were of frequent occurrence; and, unfortunately, when the culprits were prosecuted they escaped with the imposition of merely nominal penalties.

If we are to profit by the experience already gained, it will be necessary to weigh well and carefully consider the failures of the past. To probe the wound to the bottom is the only effectual treatment, and if the errors of the past 15 years are to be utilized to the

best advantage, the whole question not only of scab legislation, but also of scab administration, must be thoroughly entered into, even to the minutest detail.

I have more than once drawn attention to the system adopted for the appointment of our sheep inspectors, and were it not a matter of such vital importance I would not now touch upon this subject.

When the power to nominate the inspectors was vested in the hands of the people, one of the main questions raised was the reference to the competency and efficiency of the men selected to perform the duties required by the law. In three-fourths of the Colony the inspectors proved wholly incompetent to carry out their duties, except in the most perfunctory manner. I have no hesitation in stating that if the men selected had been compelled to undergo any test or examination before commencing their duties, nearly every one would have been condemned as incompetent to teach or instruct others as to the best methods to adopt for the eradication of scab. I am also convinced that if, when the Scab Act of 1894 was enforced, the Department of Agriculture had instituted a course of instruction at different centres, and thus in some degree educated the men who had to undertake the cleansing of the stock, the staff would have been better prepared to take their part in the campaign against scab.

As far as that portion of the Colony is concerned in which the Scab Act was enforced in March, 1895, I am certain it would have been much more profitable to have adopted this course than to allow ignorant and uneducated men to travel about the country disseminating their own crude and fossilised ideas among a people who are at least 30 years behind the times.

Since 1899, however, a question of far more consequence than the mere knowledge of Scab and its treatment has been raised. I allude to the loyalty of the men on our staff. This is a point of supreme importance, and I regret to state has proved the shibboleth which caused the downfall of a large number of our men. True, many of the staff remained loyal to their Government even though great pressure was used to cause them to waver. Many have rendered assistance, as I have already mentioned, by joining the local defence forces. A large number, however, proved disloyal, and it is my earnest desire that this fact (regrettable as it may be) should not be lightly passed over, for it is one of the object lessons which should serve as a warning light when scab legislation is again attempted. Whatever the legislation of the future may prove to be, the loyalty of the men appointed to administer the law should at least be above suspicion.

To amend or alter the existing Scab Acts will be merely waste of time. The repeal of the laws at present in force and a fresh start on altogether different lines is the only course which will produce good and lasting results.

Our Scab Acts since 1886 have provided a superabundance of law, which has had the effect of raising one problem after another,

confusing the minds of the inspectors, and even perplexing many of the magistrates who have been called upon to pronounce judgment upon contraventions of some particular section of the Acts.

A law embodying 25 or 30 clauses, plain, stringent and to the point, will prove far more effective than a multiplication of useless rules and regulations. Legislation for the eradication of scab will doubtless at an early date be introduced in the Transvaal and Orange River Colony. As this legislation is sure to be on progressive lines, it is surely time that the Cape Colony offered some example of the means and methods to be adopted to meet that end.

In any future legislation the following points should receive full consideration, viz. :—

- (1) The appointment by Government of loyal, competent, and well-paid men as sheep inspectors.
- (2) The dipping of all stock under supervision.
- (3) The partitioning of the Colony into Blocks or Areas, the several Blocks being cleansed in rotation.
- (4) The enforcement of stringent regulations regarding the removal of stock; with heavy penalties attached for any contravention of the same.
- (5) The cleansing of infected kraals and premises to be taken in hand with the cleansing of stock.
- (6) A system of brands and ear-marks to be embodied in the Act.
- (7) Heavy penalties to be imposed upon the owners of stray infected sheep; or the alternative of immediate slaughter when below a certain number.

The usual returns based upon the reports sent quarterly by the several inspectors cannot be attached this year, as no reliable or important information could be obtained for the purpose. I have secured reports from my assistants, except from assistant W. L. Currie, who is absent on active service.

115 prosecutions were made during the year, out of which 108 convictions were obtained, with fines amounting to £271 5s.

TRANSKEI SCAB REGULATIONS.

The war is in a similar manner responsible for little or no progress being made in the native territories, though not to so great an extent as in the Colony proper. For some considerable time the majority of the inspectors have been serving with the irregular forces raised for the protection of the Transkei and Griqualand East; and their places, with a few exceptions such as Elliot and Tsolo, have been filled by temporary inspectors selected from amongst the most suitable men available.

The suspension of work on the part of so many of the inspectors was naturally enough seriously felt by the progressive stock owners, European and native alike, but was unavoidable owing to the

exigency of the position. My assistant in Tembuland, Mr. Graham, has carried out his duties as far as possible in a most praiseworthy manner, although much of the time which he has had to devote to instructing the provisional men might have been under other conditions spent in supervision and travelling through his area. Mr. King, my assistant in Griqualand East, has had similar difficulties to contend with, but has done good work as far as the situation would permit.

From September Mr. King's services have been required for military purposes in assisting to repel the invaders and protecting the Territories. In this case a substitute has not been appointed.

The disturbed state of the country has also interfered with a tour which I had contemplated taking through the Transkei and East Griqualand. This, I trust, will be carried out at no very distant date.

Mr. I. P. Hughes, the inspector for Area 9 B, Umtata, has since April been travelling in Pondoland with a view to instructing and preparing the natives for the enforcement of the Regulations.

I am pleased to state that Mr. Hughes has been most cordially received in every quarter and has already done excellent work. Many dipping tanks have been constructed, and many thousands of sheep dipped under supervision. Provision has also been made for the construction of 40 more tanks, and in conjunction with the Resident Magistrates of the districts concerned the sites for these tanks have already been selected.

When the necessary funds have been authorised I trust that the Regulations will be extended over the whole of Pondoland and the inspectors appointed with as little delay as possible. The repeated requests made by the Pondos through their chiefs for the enforcement of the Scab Regulations is one of the few bright features of the situation, and is in striking contrast to the petitions which have come from the Western part of the Colony for the repeal of the Scab Acts.

The Regulations, however, require amending in many ways, and I trust the necessary alterations will be arranged before the Proclamation is extended to Pondoland so that no further change will be required for some time to come.

During the past year 549 prosecutions have taken place with 490 convictions, and fines amounting to £635 8s. Compared with last year this shows a reduction under both heads.

A. G. DAVISON, Chief Inspector of Sheep.

VETERINARY.

Tympanitis, Hoven, or "Opblasziekte" in Sheep.

Tympanitis is very frequently confounded with "geilziekte," but it is perfectly distinct. Tympanitis is simply distention of the rumen with gas, due to the animal having eaten certain kinds of food which are very liable to undergo fermentation in the stomach.

In geilziekte death is not due simply to the distention of the rumen with gas. There is rapid swelling and decomposition of the body in geilziekte, but it takes place immediately after death, and is not the actual cause of it, while the trembling and convulsive movements which precede death in geilziekte are not observed in the case of simple hoven.

Impaction of the third stomach, generally called "Drooge Geilziekte." This also is not geilziekte at all. Almost all forms of derangement of the digestive organs have a tendency to give rise to a dry and impacted condition of the third stomach, or blaarpens, more especially when the stock have been turned on to a change of pasture where they are liable to eat any irritant or poisonous plant. When there is irritation, inflammation, or serious derangement of the digestive organs, digestion is arrested; the animal ceases to chew the cud, and, as a consequence, there are no fluid portions of food passing through the third stomach, hence it becomes dry, hard, and impacted. I am of opinion that this dry condition of the third stomach is more the effect of existing disease of the digestive organs than the originating cause of such disturbance. Any sudden change of food either from succulent to dry or *vice versa* is liable to cause this form of derangement.

Geilziekte.

This is a peculiar disease characterised by its sudden onset and rapid course. There is acute disturbance of the nervous system, congestion of the venous circulation, and a tendency to the formation of gas in the stomachs with rapid decomposition immediately after death. There are several opinions with respect to the nature and cause of geilziekte, those most accepted being the following:—

(a). That it is due to the direct action of a chemical poison which is produced in certain succulent plants by the action of the strong heat of the sun;

(b). That it is due to the development of a poisonous gas, or ptomaine, in the stomach of sheep under certain peculiar conditions either of the food eaten, or of the stomach at the time; and

(c). That it is caused by a living micro-organism which gains an entrance into the system along with the food, and induces all the

symptoms and changes which are observed to follow each other so rapidly in geilziekte.

With respect to the first, the direct action of the sun's rays on succulent vegetation. "In chemical combinations the ultimate atom of bodies do not penetrate each other, they are only arranged side by side in a certain order, and the properties of the compound depend entirely on their order. If they are made to change their place or mode of arrangement by an impulse from without, they combine again in a different manner, and another compound is formed with totally different properties" (Liebig). In like manner rich succulent grasses, vegetables and fruits, when they are exposed to the radiant heat of an abnormally hot sun, have their properties so changed that they are no longer wholesome, and in some cases become positively poisonous.

The succulent grass which springs up after a rain is quite wholesome while it is green and fresh, but when it becomes wilted and blanched by the scorching rays of the sun, it becomes poisonous, and sheep eating it may in a few hours die of geilziekte.

The late Mr. Hellier and others are of opinion that the poison which is produced in succulent vegetation under the action of the hot rays of the sun is a substance similar to oxalic acid.

Finlay Dun says:—"Oxalic acid occurs in rhubarb, sorrel, and other plants," and it is very probable that the quantity may be very largely increased under the conditions referred to.

With respect to the opinion that geilziekte is due to the development of a poisonous gas, or ptomaine, within the stomach of the sheep under certain peculiar conditions either of the food eaten or of the state of the stomach at the time, there are certainly some facts which appear to support this opinion.

For instance, when acute indigestion occurs in horses or cattle certain poisonous gases appear to be formed in the mass of food contained in the stomach. These when absorbed into the blood produce first drowsiness, followed by delirium, and death either from coma or violent nervous disturbance (mad staggers). The symptoms of this peculiar deranged condition of the nervous system in horses and cattle are very similar to those exhibited by a sheep when suffering from geilziekte, only that the disease runs its course much more rapidly in the sheep. It is just possible, therefore, that some kinds of vegetation when eaten in considerable quantity under certain deranged condition of the stomach, may have a tendency to undergo chemical changes during which a poisonous gas is formed in the stomach, causing serious nervous derangement when it enters the blood and circulates through the brain and nervous ganglia. It must be admitted, however, that certain kinds of food are much more liable to undergo this peculiar chemical change than others, and when we find a large number of animals dying from this disease about the same time, and within a given area, the weight of evidence points more to some change in the vegetation itself rather than to derangement of the digestive organs of the animals affected.

In further illustration of this I may mention that during the second week of January, 1895, a considerable number of cattle died very suddenly within a limited area of Sand Flats, and my assistant, Mr. Borthwick, who saw some of those cases, states that the cattle died from suffocation due to the rapid formation of gas in the rumen, or paunch. The majority of cases were found dead in the morning, but the few that were observed and treated recovered. The medicines used with most success were common salt and turpentine. The farmers thought that the locusts, which were very numerous about that time, had left some poison on the vegetation, but, Mr. Borthwick was of opinion that it was due to some sudden change produced in the vegetation by the hot weather, as it occurred mostly where there was an abundance of couch grass. In that area fine rains fell from about Christmas to the New Year, followed a week later by very hot weather, after which the disease appeared and carried off a considerable number of cattle; the cases occurred simultaneously over a wide area, and ceased as suddenly as they began. Further, it is a well-recognised fact that when geilzickte is prevalent in a flock of sheep, if they are removed to a different pasture the disease generally ceases at once.

With regard to the opinion that geilzickte is due to the specific action of a micro-organism, I have always considered that the disease called geilzickte in this Colony bears a strong resemblance to the disease known as "Braxy" in Scotland, and veterinary authors have long held the opinion that the latter is a specific disease similar in some of its prominent characters to Anthrax, although perfectly distinct in its origin from that disease. The resemblance is shown more particularly in the congested condition of the vessels, and the rapid manner in which decomposition takes place after death.

Further, the fact that a compound such as Cooper's Dip acts as an effective preventive of geilzickte, strengthens the belief that the originating cause may be some specific micro-organism. Cooper's Powder is a chemical mixture containing arsenic, sulphur, and soda compounds as its principal active constituents, and these are known to be effective agents for the destruction of animal and vegetable parasites. Arsenic has also been proved to be an effective preventive of malarial fever in many cases which have been shown to be due to a micro-organism. Moreover, the fact that the disease is more prevalent on certain farms and in certain localities than in others, although there may be no perceptible difference in the vegetation, the climatic conditions, or the action of the sun's rays on the vegetation in the places where it prevails and where it does not, would indicate that the originating cause must be something special and peculiar to the locality. But whether the cause of geilzickte be a chemical poison which is produced in certain plants by the action of the strong heat of the sun, or a chemical poison which is produced in the sheep's stomach by certain changes which take place in the food after it is eaten, or whether the poison is developed by the action of micro-organisms swallowed with the plants.

There is abundant evidence which is accumulating yearly that a mixture of Cooper's Powder and salt is an effective preventive of this disease. How it acts, is difficult to determine, and it is equally difficult to understand how any medicine, however potent, can continue its preventive effect for such a length of time as Cooper's Powder is credited with. True, the effects of a medicine may continue for some time after the medicine itself has been entirely eliminated from the system. In this respect arsenic is known to exercise a special action on the mucous membrane which lines the digestive organs, and it may in this manner produce a condition of the stomach which is opposed to the action of the poison which induces geilziekte.

There may, however, be another explanation to account for the length of time that Cooper's Powder is said to act as a preventive of geilziekte. This disease does not prevail uninterruptedly in a flock of sheep even when no preventive measures are adopted. It will often cease for a time and then reappear with equal virulence, depending on the presence of the conditions which are favourable to its production. Now it may be that the action of Cooper's Powder continues for the length of time only that the particular outbreak would have lasted but for the action of the preventive, and that usually a considerable interval elapses before another outbreak occurs. Nevertheless, howsoever it may exercise its preventive effects, the united testimony of large numbers of sheep farmers places it beyond a doubt that Cooper's Powder, when given to a flock of sheep, does arrest the disease amongst them in a very short time.

Symptoms.—The animal apparently in full health suddenly ceases to feed, and wanders away from the flock, has a staring look, and becomes peculiarly excitable with a quivering of the eyes. The head is lifted high, the breathing becomes laboured, the countenance appears anxious, and the animal loses the control of its limbs. It totters, falls over, is seized with convulsions, and dies within from one to six hours.

Post-mortem Appearances.—If the sheep's throat is cut before it dies, and it is properly bled, there is an entire absence of any sign of disease except a little congestion of the veins, and the blood is darker than natural. But if the sheep is allowed to die, the body soon swells, and decomposition is very rapid.

Curative Remedies.—Geilziekte runs its course so rapidly that there is seldom time for the effective action of any remedy. The medicines which have been used with best success are, a teaspoonful each of mustard and chlorinated lime, given mixed in a little water; or a tablespoonful of common salt dissolved in water, with a teaspoonful of turpentine, administered carefully. A dose of purgative medicine should be given as soon as the urgent symptoms subside. If there is distention of the rumen with gas, it should be allowed to escape by inserting a proper trocar and canula into the rumen on the left side, leaving the latter in until the gas has escaped. The situation is midway between the point of the hip bone and the last

rib, and two or three inches below the point of the transverse processes of the loins. There is no danger provided that the trocar is inserted in a downward direction. If it is inserted horizontally, it might injure the kidney. A long, strong, sharp-pointed knife will answer very well, the blade after insertion would require to be turned halfround so as to distend the puncture, or a small reed might be inserted.

Preventive Measures.—These consist—where practicable—in moving the sheep to a change of veld, but care should be exercised not to place them on luxuriant pasture when they are hungry, as they would be apt to eat too greedily, and become affected with hoven, if not geilziekte. Experience shows that sheep are less liable to geilziekte when they are allowed to remain on the veld night and day, and graze when they like. Respecting medical preventives, the farmers place perfect reliance on Cooper's Powder and salt, one of the former to nine of the latter, giving a teaspoonful as a dose to a sheep, and half that to a lamb.

Mestbek, or Paralysis of the Muscles of the Cheeks and Lips of Sheep.

This is a peculiar affection which is met with amongst sheep in the Hope Town, Britstown, Richmond, and some other contiguous districts. It is really paralysis of certain muscles of the face, and is characterised by a trickling of food from the mouth during rumination principally. In some cases the muscles of one side of the face only will be paralysed, and the food will dribble from the mouth on that side; in other cases the muscles on both sides will be affected, when the food will fall from the front of the mouth. When I first examined cases of this complaint, I was under the impression that it was closely related to "Vomeerziekte," but a subsequent study of the symptoms convinced me that the nervous derangement was due to a different cause. In Vomeerziekte the animal is visibly sick and dejected looking, ceases to feed, and death often supervenes in a day or two, while in Mestbek the animal continues to eat and ruminate even when the paralysis of the facial muscles is pronounced. The animal falls off in condition very rapidly, but that is due principally to the loss of the food during mastication and rumination, especially during the latter. If an affected sheep is watched while chewing the cud, the relaxed muscles and pendulous lips allow the food to fall between the molars and the cheeks, and to dribble from the mouth in a continuous stream. The paralysis appears to be functional, at least we have hitherto been unable to discover any pressure on or disease of the nerves distributed to the affected muscles.

Cause.—I think that there can be little doubt that the paralysis is due to the physiological effects of some plant which is eaten by the sheep at certain seasons of the year. Careful examination has been

made to discover any other local cause such as irregularity of the teeth, etc., but without result.

Treatment.—The cause being unknown, the course of treatment can only be suggested by the symptoms. I would recommend at first a strong dose of purgative medicine. This would assist in eliminating the poison from the digestive organs. The food which accumulates in the cheeks should be cleared out as frequently as possible, and the insides of the cheeks and lips rubbed with common salt. A stimulating embrocation should also be rubbed into the muscles on the outside of the cheeks and face. If the affected sheep could be placed in a field of lucerne and thus removed even temporarily from the action of the exciting cause, I have little doubt that they would recover, but unfortunately where this disease is most prevalent lucerne crops are least common.

With respect to medicine, it is impossible without experiment to give definite advice, but if the paralysis is functional only, nerve-stimulants such as the following mixture might be tried: nux vomica ten to twenty grains, chloride of ammonia thirty grains, mixed in a little water and given twice a day. The bowels should be kept acting freely by occasional doses of Epsom or Glauber's Salts.

Vomeerziekte, or Vomit-Sickness of Sheep.

This is a peculiar disease which affects sheep in certain localities of the districts of Hope Town, Carnarvon, Victoria West, Kenhardt, Prieska, Britstown, and portions of the adjoining districts. The general opinion entertained by the farmers respecting the originating cause of this disease, or functional derangement of the stomach, or of the nervous centre which regulates the spasmodic movements involved in the act of vomiting, is that it is due to a certain bush known as the Vomeer-boschje—*Geigeria passerinoides*. This opinion, however, has not as yet been verified by experiment. In 1886 I fed some sheep with quantities of this plant obtained from a farm on which the disease was prevalent at the time, but I failed to produce any symptoms of the disease, and Veterinary Surgeon Dixon repeated this experiment in 1899 with the same negative result. It must be admitted, however, that this plant is generally found in considerable quantity on the veld where this disease is prevalent, and it may be that the poison is cumulative in its character, hence stock may require to feed upon it for a considerable time before it develops its physiological effects. Another opinion is that this disease is due to the sheep eating a quantity of sand in their efforts to get at the young grass which springs up after a rain in the Karoo districts. This sand, they say, accumulates in the bowels, or rather at the pyloric or bowel end of the stomach, and blocks up the passage. I was, however, unable to confirm this opinion also by numerous *post-mortem* examinations. The immediate cause of death in the majority of the cases which I examined was Broncho-pneumonia, or inflammation of

the lungs and bronchial tubes. This condition of the lungs is, however, a secondary effect of the primary irritation, and the vomiting which supervenes. If the affected sheep are watched, more especially when following the flock, it will be observed that when they cough and vomit, they make an effort at the same time to swallow the food brought up, and a certain portion passes down the trachea into the lungs, where it causes acute inflammatory action. There is no doubt about this, as the portions of the vomited matter can easily be detected in the small bronchial tubes. I have little doubt also that this condition is greatly aggravated by driving the sick sheep with the flock, which increases the vomiting and distress very much.

Post-mortem appearances.—I made a *post-mortem* examination of several sheep in the early stages of the sickness, and found the lungs free from any appearance of irritation, nor was there any obstruction in the stomach or bowels, or accumulations of sand in any part of the intestinal tract.

Symptoms.—The affected sheep walks behind the rest of the flock with a dull, tired, dejected appearance, and at short intervals it vomits. This spasmodic action is accompanied by a distressing sickly cough. There is not much food expelled from the mouth during the act of vomiting, as the sheep makes an effort to retain it in the mouth and reswallow it. When very sick the sheep does not attempt to feed, but will lie down almost constantly if left undisturbed.

Cause.—There is very little doubt that this peculiar affection is due to some nervous irritant which the animal eats. Whether it is the vomeer-boschje at present suspected, or some other plant, or some poisonous fungus that attacks certain plants at certain times of the year, which produces the physiological effects observed, I am unable to say; further experiments are necessary to determine these points.

Treatment.—Many farmers successfully give lye, a solution made from the ash obtained from certain saline bushes, and used in the Colony for making soap. I have not experimented with this lye, but I have obtained very good results by giving:—

Bicarbonate of Soda	...	a dessertspoonful.
Laudanum	...	one or two teaspoonsful.
Water	...	half a pint.

Repeat this dose morning and evening. As soon as the vomiting has ceased, give a dose of purgative medicine to clear out the offending food from the digestive organs, such as three to four ounces of epsom salts in half a pint of warm water. The affected sheep should not be allowed to follow the flock, but should be kept in a quiet place, and disturbed as little as possible. They do not want to eat, and in addition to the absence of appetite, the stomach is much better to be kept undisturbed by any food until the irritation ceases.

D. HUTCHESON, Col. Vety. Surgeon.

Malignant Jaundice of the Dog.

A CONTRIBUTION TO THE STUDY OF PYROPLASMOSIS IN THE DOG, BY
MESSRS. NOCARD, OF ALFORT, AND MOTAS, OF BUCHAREST.

This contribution by Messrs. Nocard and Motas, following that of Veterinary Surgeon Robertson which appeared in No. 12, volume xx., of the *Agricultural Journal*, will be read with great interest by all lovers of our canine friends. It is somewhat elaborate, and contains rather too many technical terms for the general reader, but it will well repay a careful perusal by those interested in the subject:—

"Last year one of us, in collaboration with M. Almy,^(1.) published a note on hæmoglobinuria in the dog, which an attentive study had enabled us to connect with the presence of hæmatozoa (pyroplasma) analogous to those of Texas fever; blood taken from the dog in question and injected into the jugular vein of a clean dog had communicated to the latter the disease with all the characteristics which it presented in the case of the former animal. This observation has been the foundation on which are based the experimental researches which constitute the object of this memorandum. Besides, this has not remained an isolated observation; we have since been able to study in the clinical school at Alfort 7 fresh similar cases: 5 in the service of Professor Almy, who has published a notice giving particulars thereof;^(2.) the two others, in the service of Professor Cadiot, are still unpublished.

"Pyroplasmosis in the dog is therefore not absolutely rare in France,^(3.) and the resemblance between the evolution of the natural and the experimental form of the disease gives a genuine practical interest to this work.

"The disease appears to exist likewise in Italy. Piana and Galli-Valerio have described and represented the parasite which they have observed on two dogs, the one icteric, the other anæmic; they point out its analogy to that of Texas fever; but it does not seem that these authors have carried their researches further, for they have published nothing since this first note.

"Celli relates that in the Roman Campagna hæmatozoa resembling those described by Piana and Galli-Valerio have been observed on dogs which have come from Lombardy.

"The disease appears to occur more frequently in Africa. R. Koch asserts that he remarked it several times during his stay in

* *Annales de l'Institut Pasteur* No 4-1902; translated by H. L. Shaw, B.A. Oxon., of this Department.

(1.) Nocard et Almy. "A Note on Pyroplasmosis in the Dog," *Bulletin*, etc.

(2.) Almy, "Fresh cases of Pyroplasmosis in the Dog." *Ibidem*.

(3.) M. P. Leblanc, in a brief note presented to the Biological Society, 20th January, 1900, states that he has perceived, in the blood of a dog attacked with infectious icterus, numerous hæmatozoa, "free in the plasma or fixed on the globules." It is probable that he here had to deal with a case of pyroplasmosis; but his description of the parasite is so short and so indefinite that it would be impossible to make any affirmative statement.

E. Africa. Marchoux had already seen it in Senegal; to the Biological Society he submitted drawings of pyroplasma remarked in the blood of eleven native dogs which moreover appeared in excellent health.

"It is known at the Cape under the names of 'biliary fever,' 'malarial fever,' and especially 'malignant jaundice.' Duncan Hutcheon well described it in 1899 in a short notice wherein he insists upon its parasitical nature, already demonstrated by Dr. Carrington Purvis, and upon its transmissibility by inoculation with blood infected with the parasite which he has been able to effect in conjunction with Spreull.

"W. Robertson's more expanded work confirms and completes the indications furnished by Duncan Hutcheon both from the experimental and clinical point of view.

"Finally, a very interesting memorandum by Lounsbury, of which Robertson's work gives a summary, shows that 'malignant jaundice' of the dog, caused by a pyroplasma analogous to that of Texas fever, is, like the latter, propagated by the medium of a distinct ixodes* which Professor Neuman of Toulouse has identified, viz.:—*Ummaphysalis leachi* (Audouin).

CLINICAL STUDY OF THE DISEASE.

"Pyroplasmosis in the dog presents, from the clinical point of view, two very distinct forms; in the one, the evolution is rapid and almost invariably followed by death; in the other, the evolution is slow and generally terminates in recovery.

(1.) *Acute Form.*—The disease manifests itself at the outset by loss of appetite and dullness. The dog remains lying in a corner, insensible to his surroundings and deaf to the calls of his master.

"From this moment fever supervenes, his temperature rises above 40° C, remains at a high figure for two or three days and then falls abruptly below normal; it may descend to 33° C; sometimes, but seldom, the thermic curve has not this regularity; the temperature always high, oscillates considerably and falls slowly and gradually; in the case of very young dogs, which succumb very quickly to the infection, the abnormally high temperature of the first stage is often absent and, as soon as the intraglobular parasites have made their appearance, their temperature sinks until death supervenes.

"During the whole duration of the disease the absence of appetite is complete, the nose is dry and hot; the animal remains lying down, curled up, dull-eyed, and insensible to all attempts to rouse him.

"The mucous membranes (eye and mouth), pale at first, assume little by little a violet tinge, then become slightly icteric (as soon as the fall in temperature is manifest).

"But the icterus† is not constant, and its intensity is very variable. In 63 cases which have taken a rapid course we have observed it 30 times; in the other 21 cases, the mucous membranes have

* Tick.

† Yellow discoloration.

remained more or less pale with, sometimes, a not very pronounced bluish tinge.

"When the icterus is present, the sclerotics* and the teguments participate in it as the mucous membranes. The pulse is rapid (120—160 per minute), small, thrady, and often comparatively intermittent. The accelerated respiration (36—48 a minute) is painful, accompanied by panting and often, in the case of puppies, by whines.

"In some rare cases, the vomiting—sometimes uncontrollable—of greenish mucous matter occurs.

"Examination of the chest reveals nothing of an abnormal character.

"The palpation of the stomach sometimes enables one to establish hypertrophy of the spleen; but this lesion is far from being the rule.

"The general sense of feeling is destroyed, the sick animals do not respond to any attempt to rouse them; they seem not to be aware of the operations to which they are subjected.

"From the commencement their walk is constrained, laboured and tottering, especially as regards the hind quarters, then partial paralysis supervenes; the dogs only raise themselves with difficulty and often fall when they are compelled to walk; finally, during the period of abnormally low temperature paralysis of the lower half of the body is almost absolute. On the approach of death, the animal falls into a state of coma; he expires quietly, without a struggle.

"On one occasion only have we observed real convulsions of the nature of tetanus when the animal has died in opisthotonos with a contraction of all the muscles.

"Immediately on the appearance of the first symptoms, even when no parasite is visible, the urine becomes albuminous and will remain so until death; the quantity of albumen increases with the number of the parasites.

"Often it is crimson, deep red, or black as coffee grounds; this coloration is not due to the presence of blood in its natural state, for red globules are never found in the urine; there is hæmoglobinuria and not hæmaturia; the hæmatospectroscope of Hénocque reveals the presence of the two bands which characterise oxy-hæmoglobin. The quantity of hæmoglobin may reach as much as $3\frac{1}{2}$ per cent.

"The hæmoglobinuric crisis generally commences a little after the appearance of the endoglobular parasites; in very acute cases, notably in the case of very young dogs, it persists until death; at the autopsy the bladder is found distended by urine as black as prune-juice.

"When the disease lasts a little longer, the hæmoglobinuria disappears and the urine re-assumes a deep yellow colour, sometimes plainly icteric.

"The hæmoglobinuria is not constant; in the six cases observed by Messrs. Nocard and Almy it has been remarked only thrice; but, as it is sometimes very transient, it is possible that it may have passed unperceived.

* Whites of the eyes.

"Of the 63 dogs which have died under our hands after inoculation, 43 have had the hæmoglobinuria in a more or less intense and lasting degree.

"The reactions of Gwelin and of Craft show the presence of biliary pigment in the urine, especially in cases which are attended with icterus or hæmoglobinuria; the reaction of the urine is acid; on one occasion only have we found it alkaline and twice neutral; sometimes, but seldom, polyuria exists.

"The blood is deeply modified; it is as pale as though it had been mixed with water; coagulation is more sluggish, the clot is softer and not so dark as usual; the serum is of a deep red tinge; the intensity in the colouring of the serum is variable, but it increases rapidly with time; it seems that the fragility of the globules, already remarkable in the case of the healthy dog, is considerably enhanced under the influence of the disease. In comparatively acute forms, when the hæmoglobinuric crisis has given way to the icterus, the serum which has exuded from the blood-clot possesses a very deep yellow colour with, sometimes, a greenish reflection.

"When the blood has been collected into a test-gauge at the bottom of which some drops of a solution of citrate of potash have been deposited to prevent coagulation, the globules accumulate at the bottom of the receiving vessel, where they form a mass of dark violet colour, the height of which measures hardly $\frac{1}{8}$ th, $\frac{1}{16}$ th and sometimes $\frac{1}{32}$ th of the height of the plasma.

"By counting the globules one is able to appreciate the considerable globular destruction which has been effected. In the healthy dog, the number of blood-corpuscles varies between 6,500,000 and 7,000,000 (according to Mallassez' method). After the appearance of the first symptoms, the number of the globules diminishes with a slow regularity; then, at the moment of the hæmoglobinuric crisis, it falls abruptly to 2 millions and below. The rate of the hæmoglobin at the same time sinks from 12-13 per cent. to 6, 4 and $3\frac{1}{2}$ per cent.

"Contrary to the red blood-corpuscles, the white globules increase in number; from 7 to 8,000 can be counted in the healthy dog; in the case of sick dogs, this figure is doubled, trebled or quadrupled: we have counted up to 40 thousand of them.

"The increase affects almost exclusively the polynuclear corpuscles it is still more pronounced in the slow forms of the disease.

"The alteration of the blood does not only consist of the considerable decrease in the number of the red blood-corpuscles; on examining a preparation of fresh blood or blood which has been coloured after fixation, one is struck by the different dimensions of the red globules; there are some whose diameter exceeds by one-third, one-half or two-thirds that of the normal globules; they also appear paler and they fix the colour in a manner less intense; on the coloured preparations an abnormal number of nucleated globules is almost observed. These alterations of the globules are still more pronounced in the slow forms,

"The acute form of the disease generally terminates by death, which supervenes from the third to the tenth day after the appearance of the first symptoms.

"2. *Slow Form*.—The slow form manifests itself chiefly by excessive anæmia, muscular weakness, sometimes by fever, but seldom by hæmoglobinuria or icterus.

"When fever exists, it shows itself only at the initial stage of the infection; it is never very pronounced, and lasts two or three days at the most; more often it is absent; still more often it passes unperceived, nothing serious in the condition of the subject calling the attention of the owner; its existence can with difficulty be ascertained save in cases of the disease induced by experimental methods. As in the acute form, it appears early and sooner when the animal has been inoculated intravenously than when it has been inoculated subcutaneously; the temperature rarely exceeds 40° C remains at this figure for 36 or 48 hours and afterwards returns to normal; on one occasion, however, we have observed a real case of quartan fever in one of our inoculated animals. Most often the fever is insignificant or is completely absent.

"Anæmia is the most constant symptom of this form. It manifests itself by the increasing paleness of the mucous membranes, the listlessness of the animals, who prefer to remain lying down indifferent to their surroundings, decrease of appetite, emaciation, general weakness, dryness of the skin and the dull state of the pulse. It lasts for a long time, from three to six weeks; then, little by little, the appetite and spirits revive, the mucous membranes regain their colour and the animal recovers his strength: recovery is complete within from six weeks to two or three months.

"If the urine is tested from the commencement of the infection, a little albumen is generally found to be present, which continues 15 to 20 days.

"The hæmoglobinuria is very rare; when it does exist, it scarcely lasts more than one or two days; in most instances the urine remains yellow and limpid; sometimes, however, it contains a sediment. Its reaction is acid; on one single occasion we have found it neutral; the urine contained at the same time a quantity of sugar; but it is probable that this state of the urine had no relation to the disease with which we are dealing.

"The examination of the blood furnishes the explanation of the progressive anæmia which affects the sick animals: the number of the red globules diminishes little by little until it sinks below 2,000,000; in one case not more than 1,200,000 per cubic millimetre were present. The hypoglobulie manifests itself especially after the fever has subsided, and it increases even after the parasites seem to have disappeared or have become very rare; after 25 to 30 days, the number of the globules increases little by little, but it is seldom before two or three months have elapsed that it returns to the normal figure.

"The loss in hæmoglobin is much less pronounced than in the

severe form, in which it may fall to $3\frac{1}{2}$ per cent.; in one case, in which the number of the globules was only 2,760,000, there still existed $9\frac{1}{2}$ per cent. of hæmoglobin.

"In the coloured preparations great differences in the dimensions and the colouring of the blood-corpuscles are observed still better than in the severe form; individual ones possess two and three times the normal diameter, and are coloured in a manner less intense many nucleated blood corpuscles are also observed, especially at the commencement of the hypoglobulic.

"The number of the white globules is always very high, from 15 to 30,000; in one case we have counted up to 54,000 of them. The hyperleucocytosis affects equally the mono and the polynuclear corpuscles. In the few days which succeed the febrile period (when it exists) leucocytes teeming with red parasitic globules are frequently observed; this phagacytosis, very rare in the severe form of the disease, is exclusively mononuclear.

"In proportion as recovery asserts itself, the number of the red globules increases, that of the white globules decreases, and not more than a few nucleated red globules are found; on the other hand, numerous masses of hæmatoblasts are observed.

THE PARASITE.

"Whatever may be the form of the disease, by testing the blood we are able to establish the presence therein of an endoglobular hæmatozoön very closely related to that which causes Texas fever.

"Very plentiful in the rapid forms of the disease, it is sometimes, in the slow forms, very difficult to demonstrate; the result is arrived at, however, by systematically examining the blood of the capillary circulation, several days following if it is necessary.

"The pursuit of the parasite, with a view to diagnosis, is most simple; upon a perfectly clean cover-glass a very small droplet of blood, obtained by pricking the skin of the ear, is deposited; this is spread in a layer as thin as possible by the aid of another cover-glass the polished edge of which is made to slide over the flat portion of the plate first mentioned; it is dried rapidly in the open air; it is fixed by ether or alcohol or by absolute alcohol; then, when the fixative has completely and spontaneously evaporated, a few drops of Nicolle's phenic thionin are deposited upon the surface of the plate. If the thionin is good, a contact of 30 seconds is sufficient; wash, dry and examine it by magnifying it from 500 to 600 diameters. The blood-corpuscles are pale green in colour; the parasites present themselves in the form of small bodies defined by a very distinct outline highly coloured in blue, with a central portion void of colour or of a very pale blue.

"The majority of the infected globules contain only one parasite, large and circular in shape: but globules which comprise 2, 4, 6, 8, 12 and even up to 16 parasites are also found, especially in the rapid form of the disease; they are then smaller, irregular in their outline, polyhedral sometimes, but seldom pyriform.

"The number of the parasitic globules varies considerably according to the form of the disease and, in each form, according to the period of evolution. In the acute forms, during the fever or immediately after, whether there be a hæmoglobinuric crisis or not, the parasites abound in considerable numbers. In the slow forms they are so rare that they can escape the searches of the most expert observer.

"In these difficult cases, the examination of the preparation ought to be concentrated on the point where ends the layer of spread blood. It is there that there are the greatest chances of perceiving the parasites if the blood contains them.

"It is accordingly a wise precaution to deposit on the cover-glass only a very diminutive drop of blood, in such a manner that the very thin layer which it is to form after being spread does not extend to the extremity of the cover-glass."

A minute description of the methods of preparation and colouring necessary for the study and evolution of the parasite is then given, which although of great value scientifically, is not of so much interest to the general reader.

It is very interesting to note, however, what M. Nocard says respecting the amœboid movements of the parasites. To study these to advantage the blood requires to be examined in a fresh state, and only gives good results when obtained during the febrile period, or immediately after the fall of temperature.

Further, the examination must be made in a hot chamber, and have for its object a mixture of equal parts of blood and aqueous moisture. He says:—

"The infected globules are larger and paler than the others; the hæmatozoön appears as a small irregularly rounded mass of which the outline is very dark and the centre highly refractive.

"In the hot chamber it is easy to observe the parasite changing its form; its outline becomes irregular; extensions form which move tapering towards the circumference of the globule, and then contract in order to unite again with the central mass of the parasite; fairly often two or three pseudopodes are thus observed proceeding clearly from the parasite; these motions are sometimes sufficiently rapid to cause the infected globule to pirouette on its own axis.

"In other cases wherein the parasite seems contracted into a globulous mass, motionless at the centre of the blood-corpuscle, very small, highly refractive corpuscles are perceived which, endowed with very swift motion, seem to whirl around it. Of the nature and significance of these gyrations we are ignorant.

"Very soon after the febrile period, the hæmatozoa seem to lose their amœboid peculiarities; they remain motionless at the centre of the infected globule in the shape of a rounded mass.

"Free parasites sometimes exist in the plasma, because they have succeeded in issuing from the globule or rather because the globule which contained them has been destroyed. The examination of the

blood in the fresh state with difficulty allows of their being distinguished from the proteid granulations, cellular or other debris which are in suspension in the plasma. Success is, however, attained by diluting the blood to be examined in some physiological liquid lightly tinted with methylene blue; the parasites assume a faint blue colouring which allows of their being differentiated from the globular protoplasm or from its debris which have remained colourless.

"This method also facilitates the study of the intra-globular parasite, which becomes slightly coloured without ceasing to move. These results of the examination of the blood in the fresh state furnish the explanation of the great diversity of forms which the parasite assumes on the coloured preparations.

"At the commencement of the disease, only a single parasite is generally observed in each infected globule; it is bulky and rounded; a little later the parasitic globules are more numerous and many contain several parasites.

"It is then that the pyriform hæmatozoa can be observed, connected or not by their tapering extremity; but the pear shape is always very rare.

"Towards the end of the febrile period, or just immediately after, the most varied amœboid forms appear; the hæmatozoa are polyhedral or elongated or, as it were, ramified; their outline bristles with roughnesses and with pseudopodes which are sometimes very delicate and resemble curled or contorted 'flagella.'*

"In the slow forms of the disease, after the febrile period, the parasites, imperfectly rounded, seem smaller; several of them are seldom found in the same globule.

"Preparations made immediately after death with the blood of the capillaries of the organic tissues show a more considerable number of infected globules; the parasites in it are also smaller than in the blood of the general circulation and are almost all round.

"The volume of the hæmatozoön varies not only according to the period of the disease but also according to the age of the sick animal; it is larger in puppies, to the extent of sometimes occupying more than half of the globular surface; in full-grown dogs it is much smaller, and, towards the end of the disease, it might be thought to be reduced to its nucleus around which the condensed protoplasm forms no more than a sort of slender crown.

"The free parasites appear more bulky than those which are intraglobular.

"The parasite is composed of a protoplasmic mass provided with a nucleus (caryosoma or centrosoma).

"The protoplasmic matter appears condensed at the periphery, which firmly fixes the colouring matter and has the appearance of an enveloping membrane; the central hyaline portion contains no granulation which is colourable by processes in use.

* Lash-like appendages.

"The nucleus directs the multiplying phenomena of the parasite ; our method of colouration gives it a strong carmine colour, while it colours the protoplasm blue.

"The shape and situation of the nucleus vary considerably ; during the febrile period, the parasites, round in shape, have their nucleus elongated and eccentric : it runs along the edge of the hæmatozoön over an extent equal to about $\frac{1}{5}$ th of its contour.

"In the blood of the parenchymata, always richer in hæmatozoa than that of the general circulation, the parasite is smaller and affects chiefly the circular shape ; the nucleus occupies its centre ; in its immediate vicinity the protoplasm seems varified. It is coloured less there than at the periphery. This peculiar aspect is observed to be identical in the blood of the general circulation if first tapped after death or in the blood obtained before death but kept for a few days in the cellar.

"The multiplication of the hæmatozoön takes place by direct division (bipartition). It is most active during the febrile period. The blood of the general circulation is not favourable to the study of these phenomena ; the division occurs too quickly, in an irregular, one may say disorderly, manner. On the other hand, in the blood of the capillaries of the organs (liver, kidneys, bone-marrow) the division takes place slowly, regularly, and all its phases can there be followed.

"In the normal state or state of rest, the hæmatozoön is round and the nucleus, likewise rounded, occupies its centre. When the parasite is on the point of dividing itself, the nucleus stretches itself while at the same time it withdraws itself from the centre and gains the periphery of the protoplasmic mass ; then, in proportion as the nucleus lengthens itself, its middle portion is strangulated and soon the division is complete. The two nuclei so formed next recede from each other by passing along the contour of the parasite until they occupy its opposite poles ; at the same time the protoplasm becomes condensed along an equatorial line in such a manner that each nucleus seems to occupy the centre of a colourless zone wherein the protoplasm becomes more and more rarified. An indentation soon appears at the two extremities of the condensed zone, and, little by little, as though influenced by an endeavour on the part of the two nuclei to drag in inverse directions, the indentations increase in depth until they are no longer separated save by a thin strip of protoplasmic matter which keeps the two new parasites, elongated into the shape of pears, still united ; at this moment, the nuclei, hitherto situated on the periphery of the organ, again approach the centre while gradually resuming their circular shape. Once the separation is completed, the protoplasm resumes the globular form, which seems indeed to be the normal state of the parasite.

"The new parasites afterwards multiply, following the same process, in the same globule, which is capable of containing four, afterwards 8 and so on up to 16 hæmatozoa.

"The globule thus distended increases in size, and then bursts in

some way, leaving at liberty in the plasma the newly formed parasites which, owing to their amœboid impulses, proceed to infect new globules, unless they are absorbed and destroyed by some phagocyte.

"It appears that one of the hæmatozoa thus formed within the blood-corpuscle does not multiply in its turn or only divides itself slowly. This explains the fact that globules containing 3, 6 or 12 parasites can be found. But in the immense majority of cases, when a globule contains several parasites, they are of an even number.

"Hæmatozoa are sometimes met with which show on their contour small round projections, coloured carmine like the nucleus, as though the parasite could also multiply by budding. But the fact is very rare and we have never established it in fresh preparations.

"The parasites are always much more numerous in the blood of the capillaries of the parenchymata than in the blood of the heart; the kidney contains the most infected globules, and it is also in the kidney that the number of parasites contained in each globule is most considerable. Blood-corpuscles containing 12, 14, 16 and 18 parasites are frequently to be observed therein.

"Next come, in order of frequency, the spleen, the liver, the bone-marrow, the lungs, the heart, the ganglia, the intestinal mucous membrane and the nervous centres."

(To be continued.)

HORTICULTURE.

Practical Orchard Work at the Cape.

(Continued from page 751 vol. XX.)

THE WALNUT AND CHESTNUT.

These two valuable trees have hardly yet received the attention they deserve, and the tendency to treat them as something akin to forest plantation trees rather than orchard stock militates against their due estimation and careful culture. The walnut absolutely requires a deep rich soil, with plentiful moisture deep down under the superficial layer, if it is to make an adequate return for the comparatively large space it demands. It certainly will grow to wood if parsimoniously treated, but its marketable return in such condition is only small. Hitherto it has almost always been reproduced by seedlings from selected nuts, and consequently the ordinary Cape

walnut of the market is variable and often small. It is also a fact that some seedling trees will remain persistently barren even when fifteen to twenty years old. Of course, the care and discernment which go to the production of other fruits will equally beneficially affect this one, and at least one attempt known to us has been made to import and propagate the very best sorts known from France, in which country very great attention is paid to the improvement of the race. Either budding or grafting may be adopted, and even large trees of unsatisfactory product may be improved by these means. They are to be headed back in the off season, and when fresh shoots have started for the following season a few are selected for future growth and worked upon by annular or ring-budding, the rest being cut out. It is important to note, in grafting the walnut, if that mode be preferred, that the common split-graft should not be used, or at least if tried, the section should never cross the central pith. It is better by far to cut out an angular wedge-shaped groove and cut the scion correspondingly to fit in sideways. Even the scion should be cut so as to expose little or none of the pith. Inserting a scion after the manner of a bud is also a good method. Quickness of manipulation, very sharp tools, and unusual care in covering up with grafting wax or its equivalent are desirable. On the whole, for this climate, low grafting and covering with a generous heap of soil for a season is advisable, but the formation of accessory rootlets from the scion must be guarded against. As the walnut is late in starting its sap and in leafing, it is necessary to collect the scions in advance, and keep them over, stratified in sand just moist enough to hang together, until the stocks are fairly under weigh with their spring buds. The pruning of these trees is very simple. The axial centre growth should not be headed back, for it is inadvisable to attempt a dwarfed pattern. The lowest laterals should start from $3\frac{1}{2}$ to 4 feet from the ground, and be allowed to spread enough ultimately to shade the ground occupied by the roots, and with young standards it is quite worth while to protect the bark so long as it is tender with some suitable sun screen on the north side. Any young shoots killed by sunburn and hot winds should be cut back to the quick at once to prevent the branch dying back. The fruit ripens in a leisurely way and never all at once, hence it is not advisable to make a harvest straight away. It is better to collect the droppers first, and every week to go over the trees with light rods to dislodge the largest fruit, the earlier lots meanwhile being exposed to the air in the shade on frames to dry sufficiently for storing, covering them up at night. If thus treated for about four days, and turned over repeatedly, they will be dry enough, but will require a little vigilance to prevent any mouldiness supervening inside. The soft-shell walnuts require close attention so as not to carry the desiccation too far, else they are apt to crack, let in air, and shrivel the kernels. All are best temporarily stored in boxes until marked in the usual way in bags. The custom of bagging at once and standing the bags on the more or less damp earth is the main reason that there are so

many musty walnuts about. In Kent it is usual to wash over the whole gathering with clear lime-water and then dry quickly in a draught of air. The result is that the brown, inner skin peels off very readily and the flesh gains in plumpness.

There are many good varieties known in France and grown carefully to name.

The walnut is remarkably free from parasitic enemies of either kind. The only one to be feared is the red spider, *Tetranychus telarius*, which spins its microscopic webs on the under side of the leaves and produces a sickly condition, especially in dry seasons. The persistent use of paraffine emulsion with the spray-pump, using the finest nozzle available, directed from inside the tree to take the enemy in the rear, speedily disposes of the difficulty.

Complaints are often made of walnuts not germinating when sown, and of difficulty in transplanting them from the nursery. The real reason is the general carelessness with which the nuts are stored and the frequency with which a fungous mould is allowed to penetrate the shell. The walnut is naturally very slow in germinating. The seed-bed should therefore be well trenched and drained, and be so deep as to preclude chances of its ever drying out below the depth of the seed, or requiring heavy waterings. The nuts should be planted with the outer shell still on, and not more than a full inch below the surface. When seedlings have completed their second season they should be transplanted, because the habit of the walnut, like that of the oak, is to develop an enormous tap-root with comparatively few lateral expansions. By transplanting, this tendency is overcome, the descending axis is cut smoothly off and a fine output of subsidiary lateral roots follows. If the walnuts are sown where they are intended to remain, and if there is not underneath a barren subsoil, a rocky or a watery substratum, transplanting may be let alone. But it is the safest course all round.

Attention is directed to the reports of the late excellent Forest Officer, Mr. J. H. Cooper, upon the growth of the walnut in the districts of Congo and Oudtshoorn, given in the Report of the Superintendent of Woods and Forests for 1888, pp. 39-40.

As with the walnut so to some extent with the chestnut, the French growers lead the way. It is less choice as to soil and will succeed on soil altogether too heavy for the walnut. But it is more likely to deteriorate or throw back in seedlings than is its companion, and very many trees bear mere empty burs all through their useless lives. Hence there is the more need to be careful in selection and in working. It succeeds best by annular budding, but may be side-grafted with a little care and by the intervention of the earth mound. The seedlings should be treated by transplanting, the same way as the walnut, left a season, budded, and afterwards planted out in the fourth year at farthest.

THE QUINCE.

The quince grows so readily in the bush form, and produces such heavy crops of fruit for which there is only a very languid market at

present, that it scarcely seems necessary to say much about it here. Certainly the quince is not prized at its full comestible value, perhaps because it is so cheap. Yet it would be well worth while, now that jam factories are at work among us, to pay more attention to this fine fruit. The quince is best grown as a low standard; this implies letting the central axis of the tree get up, and working the laterals so as to make a pyramid shape of it. Under any system the tendency of the tree to run out into long, lanky shoots must be checked, and fully as much as half the new growth of the year will require cutting back. If this is not done, the weight of the fruit acting with the long leverage of the branches will be apt to snap them off. When the rooted cuttings are planted in place, it is well to keep an eye on the buds just when they begin to swell, and to rub out the weakest two of the three which often appear together. This will prevent the tree from wasting itself and will secure a neat, clean growth. By far the best method for raising quinces of fine quality is to graft selected sorts upon pear stock for standard growth. If this were generally done, there can be little doubt that this fine cooking fruit would take its proper place on the market and would be much sought after, instead of being a sort of pariah of the orchard. The varieties that have arisen here as seedlings are very numerous. In selecting a good sort regard should be had to the quality of the fruit when cooked. Many quinces do not colour well and exhibit hard spots here and there in the flesh. There are also sorts that are subject to a fungus blight, *Entomosporium maculatum* Lév., which makes havoc among the leaves, causing them to turn brown and fall. The result is imperfectly nourished fruit.

Quince trees of the newest and best varieties have been introduced of late years, and are now to be had of nurserymen. It would therefore be well to take some care in selection of sorts, instead of being content, as heretofore, with a bundle of cuttings from the nearest hedge.

Return of Fruit Exported

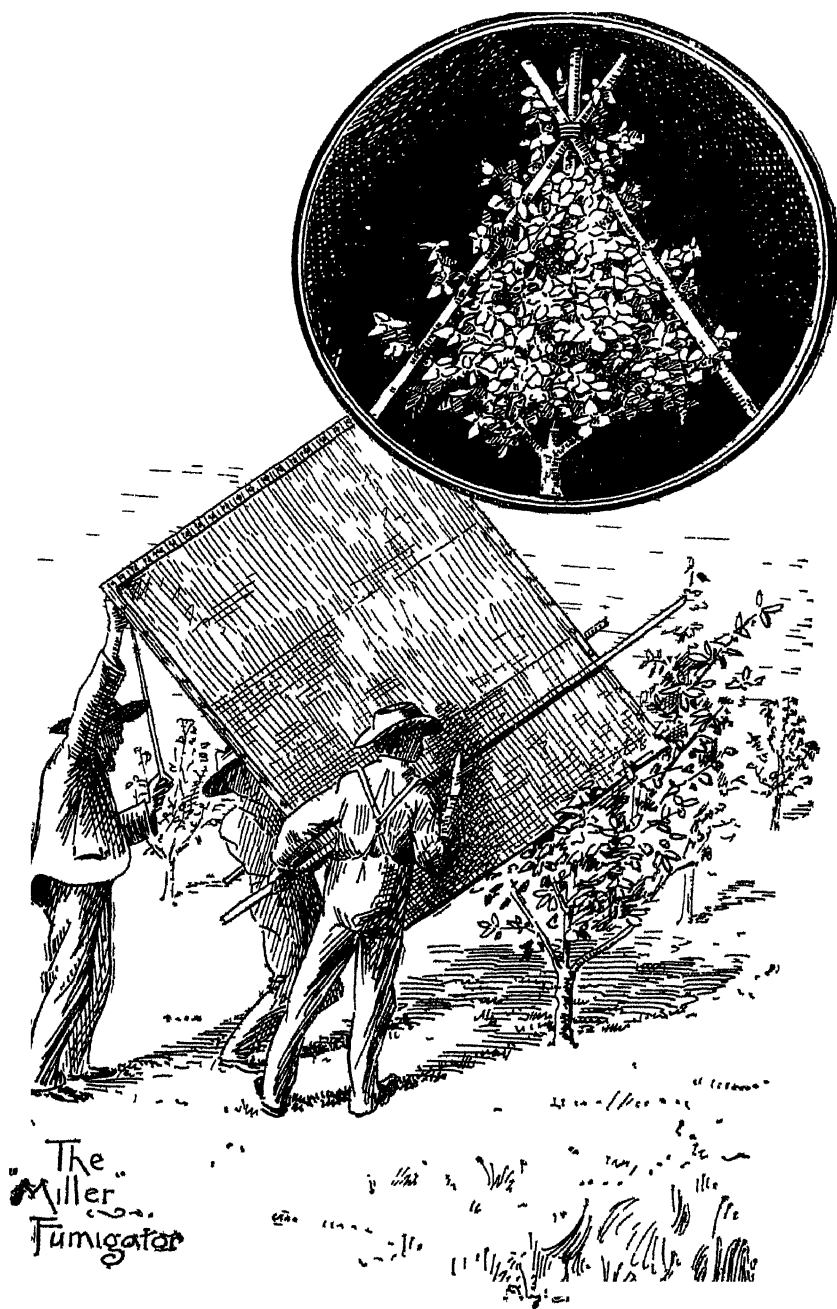
DURING THE MONTH OF MAY, 1902.

Port.	Variety of Fruit.	No. of Packages.	Quantity.	Declared Value.
				£ s. d.
Cape Town.	Apples ...	4	400	3 0 0
	Naartjes ...	571	12,820	126 5 0
Total		575	13,220	£129 5 0

Fumigation under Box Covers.

Few practical fruit-growers who have accustomed themselves to sheet and dome covers for hydrocyanic acid gas fumigation would seriously think for a moment of changing to "box" covers for their ordinary fumigation work with citrous trees; but the box covers to be described should have an interest to them, for in this age of rapid progress one can only stay abreast of the times by keeping himself well informed on the various methods and appliances used in other go-ahead countries to do work similar to that in which he is engaged. The fumigation remedy for scale insects is not twenty years old yet, and the room for improvement in the apparatus for applying it may be still far from exhaustion.

Fumigation was taken up in Cape orchards during 1894, and two years later it made great headway; by 1898 it was well understood almost all over the Colony and was starting in Natal and the Transvaal. It is not generally known, yet it is a fact of which we may be proud, that Cape Colony was the first country to follow the lead of California in fumigation and that it is still in advance of other countries, including even the Eastern States of America. It is a lead, however, that cannot be kept, as with our small and scattered orchards there is little scope for development and extension. The remedy was introduced to the Cape by Mr. P. J. Cillie, C.'son, of Wellington, on his return from a visit to California in 1893, and by Mr. Henry Meyers, late of Fernwood, Newlands, who read of the treatment in Californian horticultural reports that had chanced into his hands. Mr. Cillie's covers were small ones of the well-known dome or tent sort, and with them he worked in a small way about Wellington. Mr. Meyers read only of the early sorts like the "Titus," "Wolfskill" and "Culver" fumigators, and these types being seemingly unnecessarily cumbersome he made a modification which if this were America would have been widely described, figured and boomed as the "Meyers Fumigator." The cover was made of strong calico, heavily dressed with oil and lampblack to render it gas-tight and light-tight, and was fitted over a light rod-iron framework. In use it was suspended from the vertex of a gigantic tripod of light bamboo poles, and was raised and lowered by a simple arrangement of ropes and pulleys. It was no great trouble to move the tripod with its suspended, drawn-up cover from tree to tree, and altogether the apparatus seemed very successful. It was gas-tight and light-tight, it was adjustable in height and its flexible sides permitted some extension in width, its capacity was easily and fairly accurately calculated, and its manipulation was not difficult. But Mr. Meyers is practical, and he discarded his own device with the introduction of sheet and dome covers, covers which were inferior to his own in all respects except in adjustableness and ease of handling. The new covers are neither light-tight nor gas-tight, their entire



The
Miller
Fumigator

weight rests on the tree, and the space they enclose can be only roughly calculated; but they can be changed from tree to tree simply and quickly, they are far more adaptable to trees of varying size and shape than all other types ever suggested, they are good for use on the steepest hillside, and experience has demonstrated that they can be relied upon for good work.

The general public of the Eastern United States are very much where we were in 1895 in the matter of fumigation. The remedy has hardly "caught on" amongst the growers yet and most of the fumigating has been by agricultural station experimenters, in consequence of which there has been a clinging to ideals. It is considered desirable to have a method by which the space encompassed can be kept nearly constant, and one that can be applied with the least possible wear and tear on the tree and cover, and in which there is the minimum leakage of gas during the period of exposure. The result is treatment under "box fumigators," and an interesting development in these covers is in progress. We are interested, because however satisfied we may at present feel with the sheet and dome covers given us by California and here improved to meet our peculiar conditions, we stand willing to learn and anxious to avail ourselves of any and every improvement that their experience and experiments suggest. We quite realize that our present apparatus is far from perfect.

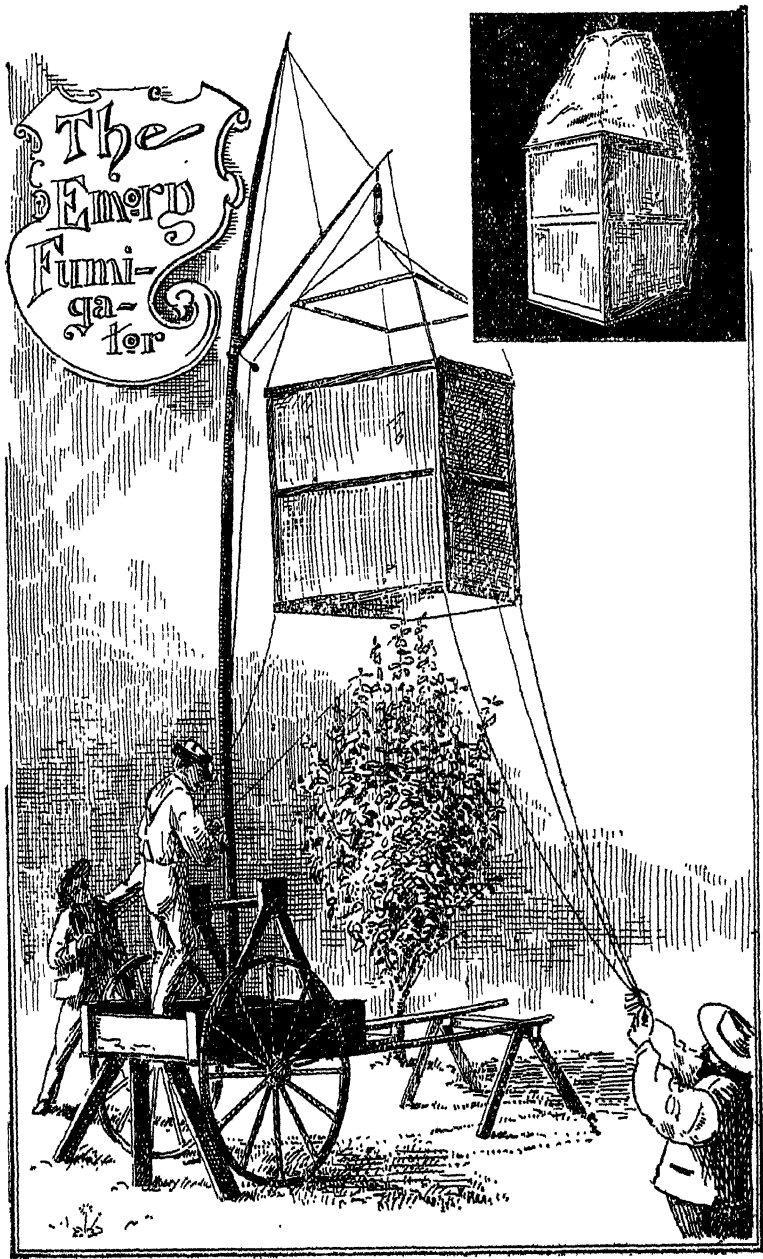
The problem in the Eastern States is more difficult than ours. There the remedy is applied to deciduous trees, whereas here it is almost solely in use for citrous trees. The shape, more open character, comparative brittleness of the fruit spurs and rigidity of branches, and the absence of foliage in winter all combine to make single sheet and dome covers much less suitable for deciduous trees than citrous trees, and hence it is, in large part, that the Yankees are not content with the kind of covers that we consider satisfactory. What we sincerely hope is that they will evolve a type that has advantages over ours for our class of work. Then again they may indicate to us that the gas remedy is as economical as liquid insecticides for our scales on deciduous trees, and we must bear in mind that at any time the notorious San José Scale may reach us and run riot in our deciduous orchards, thereby demanding the most eradivative of remedies, in other words—cyanide gas fumigation. The San José Scale is on the increase in America and Australia, and we (most foolishly in the writer's opinion) still permit the wholesale importation of trees with only the slight safeguard of port inspection. Also, as matters now are, we must acknowledge box covers more reliable than our types for a beginner in fumigation, and that they are more serviceable for the treatment of rose bushes, garden shrubs and very small citrous trees. The treatment of very small trees under unsupported cloth covers is inadvisable because of the great risk of overdosing or underdosing them owing to the difficulty of even approximately gauging the space enclosed. Now a common plan to reduce the risk is to use a rough tripod of reeds or bamboo

sticks to keep the cover expanded to a fairly constant size (see illustration), but the results are often unsatisfactory.

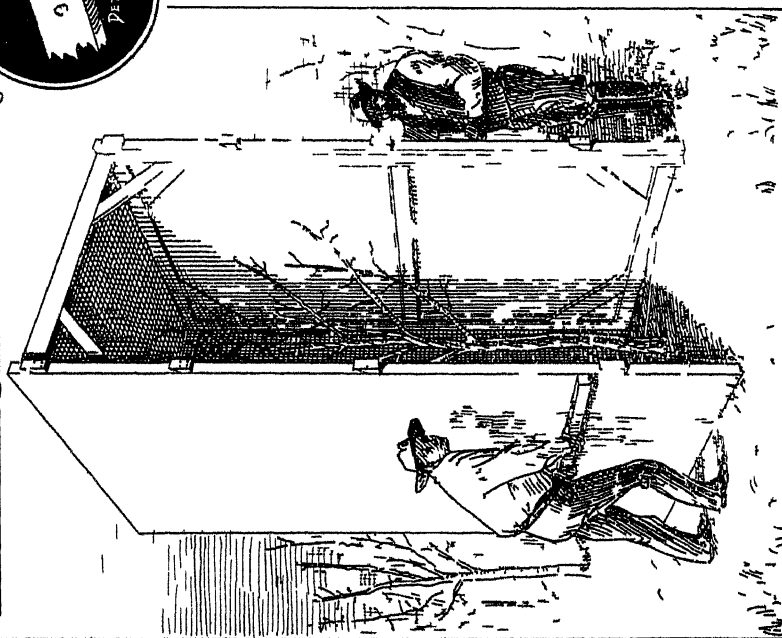
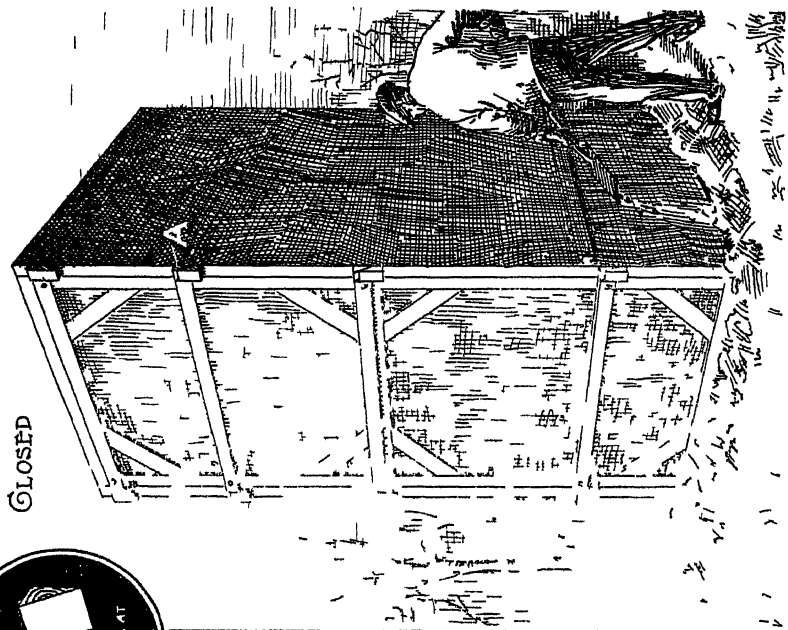
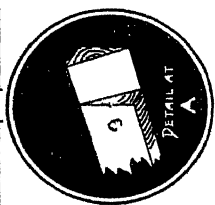
The simplest form of box cover is that illustrated as the "Miller Fumigator." Several modifications of this type are in use in the Colony for treating small trees, bushes, and nursery rows. They all are unwieldy and occupy much space when stored away, but they are easily made and can be depended on for uniformly good work with small trees. A few of our farmers have made this type of box cover with the cloth easily removable for use like a dome cover, and with the frame so put together that it may be readily taken to pieces for stowing away.

The "Emery Fumigator" is a compromise between the Miller form and the ordinary dome cover, and it combines the advantages and disadvantages of both forms. Professor W. G. Johnson, formerly of the Maryland Experiment Station, is responsible for its origin, and it is from illustrations in a recent book by him ("Fumigation Methods," price one dollar of Orange Judd Co., New York) that our sketches of this and the Miller type were made. The figures show clearly how the Emery Fumigator is raised and lowered, and while at first sight the hoisting gear may cause a critical smile on the faces of those readers who have assisted in manipulating far larger sheet covers by much simpler means, there may be and probably is considerable merit in Professor Johnson's apparatus. He is one of the most business-like of economic entomologists and unlikely to back anything not a success in practice. The covering material of the Emery and Miller Fumigators is heavily oiled eight-ounce duck. Johnson tried heavy building paper, but soon rejected it because of difficulty in getting it on smoothly and because it was more easily punctured than cloth. The extension top of the Emery admits of the use of this type with trees of almost double the height of the box. With ten covers and a crew of three or four men, aided by favourable conditions, one hundred and seventy-five to two hundred trees from twelve to seventeen feet in height can be done in a day according to Professor Johnson.

The "Lowe Fumigator," the illustrations of which are adapted from figures in bulletins of the New York State Experiment Station, of which institution Professor Lowe is entomologist, is to my mind a distinct advance on the types previously discussed, although perhaps after a fair trial the Emery might prove the more practical for extensive work despite its clumsiness and apparently complex tackle. The open front of the Lowe enables the operators to enclose a tree without elevating the sides more than is necessary in carrying the apparatus, and the means of attaching the removable door seem simple and effective (see detail at "A"). The wedge-shaped ends of the cross strips on the door fit into corresponding blocks on the door casings, and thus its own weight suffices to hold the door in position. Professor Lowe says that both strips and blocks should be made of hard wood or metal and that they need to be very securely bolted in place. The surfaces of contact between door and frame



THE LOWE BOX FUMIGATOR.



are padded with felt and the blocks greased occasionally in order to secure a close fit with the least degree of friction. The frame of the fumigator is made of well-seasoned deal strips three inches wide and seven-eighths thick, braced with pieces of about one-half the width. Various modifications of the Lowe fumigator will suggest themselves to the thoughtful reader. It would at least seem a great improvement to so make the box that it could be easily taken to pieces for transport and storage. The sides and top might be made separately and held together when set up by bolts with flanged nuts. Strips of canvas, flannel or felt tacked over the surfaces of the frame that come in contact should suffice to make tight joints when the nuts are set. Special clamp levers could be made to answer the purpose of the bolts and nuts and would be more easily loosened and tightened. Professor Lowe used buttons at first to hold the door in place, but he deems his present device decidedly superior.

Professor Sirrinc, until very recently also connected with the New York State Experiment Station but who was located in another section of the State, has given expression to his ideas of an ideal fumigator in a box cover of an entirely novel type. He deemed that the square box enclosed much unnecessary waste space, and that the contrivance should be made with an opening side to take the tree and that it should fold up for storage. The result is his "hexagonal folding fumigator" here depicted. For one ten feet in diameter and twelve feet high, the six sides were made separately and each measured six feet by twelve feet. The vertical strips were made by ripping nine-inch rough spruce boards into four pieces each. By making the two outer cuts on the boards at diagonal and the middle one straight across, the four strips were secured with each one bevelled on one side to an angle of 60° and straight on the other. The bevelled sides were used outwards, and thus when all were opposed the complete frame was of the desired hexagonal form. The strips as cut measured two and a half inches for the outside, one and three-fourths for the inside, and were of the thickness of the board, which was one and one-quarter inches. The horizontal strips were made about three inches wide and the several diagonal braces one by two inches in section. The joints were not mortised but were mitred and firmly nailed and strengthened by triangular corner blocks. The separate sides were hinged together in pairs, with the hinges opening on the outside, and then two of the pairs were hinged to the third with the hinges inside. This left the six sides so that they could be spread out to form the hexagon or folded fan-like one on another into the surface area of a single one. Four back-flap hinges were used for each joint. When set up for use the completing joint at the front was made with hooks and eyes. The top was made in three sections, the middle one rectangular, six by ten feet in size, and the side ones triangular. Diagonal braces from corner to corner and a triangular cross-brace projecting above its centre kept the middle section firm, and to it were hinged the two.

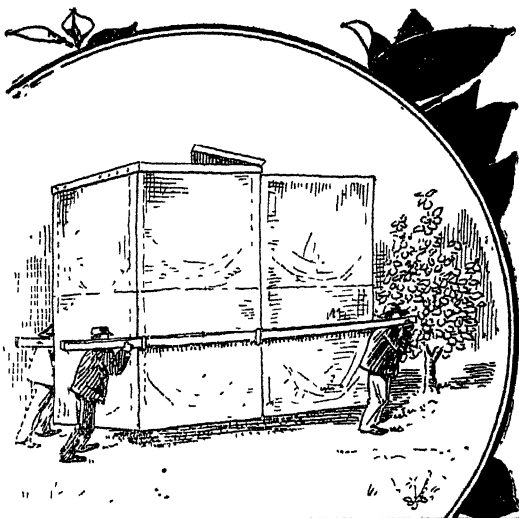
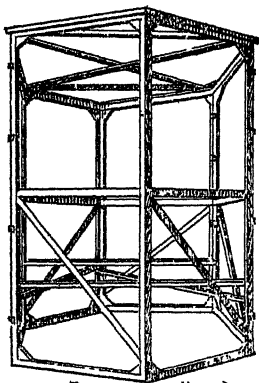
side sections. By means of a cleat all around, the whole top was made to fit over the side frame and the two parts were then held together by hooks and eyes. Canton flannel was used to face all the joints, and as far as possible it was fixed in place after the cloth covering was on and oiled, as the oil was found to have a glazing effect. The flannel was considered superior to felt. Good quality unbleached calico was used for covering the frame, and after being tacked in place it was painted two or three times with a mixture of raw oil, lampblack and beeswax.

To manipulate the Sirrine fumigator the front lid of the top was unhooked and turned back, the two front sides opened from one another, and the whole contrivance bodily carried to or from the tree by four men as is shown in one of the sketches. The long poles on which the weight was borne fitted under open-bar staples on the frame at shoulder height, and this left the front men each with one hand at liberty to hold the doors open and push back projecting branches. Professor Sirrine thinks that with twelve box covers of his type a crew of nine men might succeed in treating one hundred and eighty trees not over twelve feet in height during a working day of ten hours.

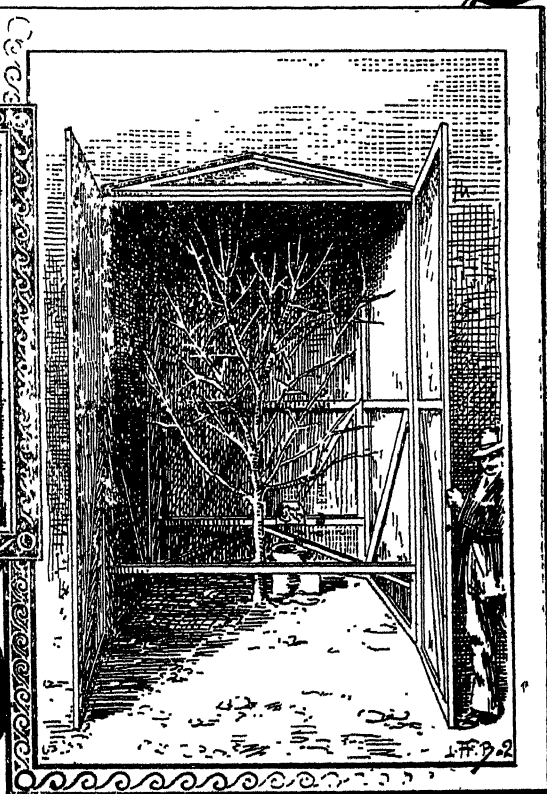
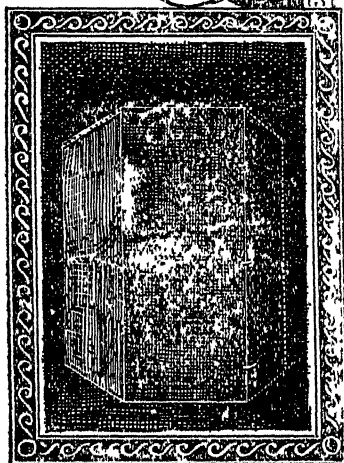
With the Sirrine and Lowe fumigators, the generating vessel with the charge of mixed acid and water is placed in a certain position within the box and the dose of cyanide supported on a short pivoted board above it; then after the front is closed and fastened the pivoted board is tipped from outside to drop the cyanide into the vessel.

Box fumigators of all the sorts described may easily be made on the farm. It has been thought desirable to only roughly give the details of their construction in these notes, but further information, on application, will cheerfully be sent to any farmer who undertakes to make similar apparatus for himself. It will be observed that none of the forms are useful for trees over seventeen feet in height, and that only one, the Emery, seems practicable for those over twelve feet. It is very likely that for trees above twenty feet high no type of cover better than the simple sheet will ever be devised.

CHAS. P. LOUNSBURY, Govt. Entomologist.



THE "SIRRIE" FUMIGATOR



VITICULTURE.

Reflections on the Needs of Colonial Viticulture.

Viticulture, I take it, is by most men, versed in agricultural matters in the Colony, considered to be an industry which could hardly be missed, at least in some parts, where it has been carried on practically since the time the Colony has been founded, without its absence causing a state of financial despondency hitherto unknown.

The importance of that industry to the Colony, mainly based on the exceptional adaptation of the Western districts to the production of grapes; the fact of vine-growing yielding comparatively quick and almost absolutely reliable returns with a relative small outlay on annual labour, is enhanced by viticulture admitting of the utilization of land which otherwise had to be defined as waste land, and the experience of such ground producing wines superior in quality to wines from rich, fertile lands.

In spite, or probably partly on account, of such favourable conditions pertaining to the production of grapes, viticulture has in reality not sufficiently advanced during all these years to enjoy the position it deserves as a national industry upon which the well-being of a considerable portion of the Colony depends. On the contrary, it is looked down upon in some quarters and branded as responsible for the existence of many evils. Unfortunately this view is not absolutely correct, though it does not follow that similar evils have not been brought about in other ways had vines not been cultivated, since for a long period of years viticulture practically depended to the greater extent for the consumption of its product on the coloured classes. This state of affairs has fortunately changed to some degree for the better, our colonial wines becoming more and more an article of consumption with the white population. In the interest of viticulture every endeavour should be made to widen this consumption, and that may only be achieved by improving constantly and systematically the quality of our wines.

At present too much low wine is still made and too much attention is still given to the production of quantity instead of quality. Admitting that, as is often wrongly asserted, it does not pay to produce good quality, or at least not as well as inferior wine, on account of the extra cost, producers must bear in mind that it is for various reasons essential to reverse in time the system and produce quality instead of quantity. We depend almost exclusively on local consumption, and of wine next to nothing is exported. This local consumption, as far as the coloured classes are concerned, may any day receive a check, and what would its effect be were the white population to discontinue to consume our wines on account of their inferior quality? Further, let the producer reflect upon the

fact of the introduction of American vines having not only increased the productiveness of our vineyards, but, having in addition widened the possibilities of vine-culture, as by a judicious selection of resistant stocks land may now be made to yield remunerative returns, hitherto badly adapted for vine-growing, so that in the near future the annual output of wine may be expected to increase by leaps and bounds.

Quality and not quantity must, as above said, be our future motto. We must aim at the production of a wine capable, by virtue of its properties, to become the national beverage of South Africa, capable of displacing the imported article, particularly the imported spirit, frequently of such very inferior quality. Should wine-growers set themselves this task and succeed in accomplishing it, they would not only help themselves but would in addition become public benefactors, as with an increasing consumption of good wine drunkenness decreases, a fact borne out by a world-wide experience.

It will, as a matter of course, be quite impossible to rapidly effect this change of attitude, for many obstacles have to be overcome, and among them the sometimes unreasonable prejudice against Cape wines. Unreasonable I say, if it be possible, as it has actually occurred, that a Colonial Hermitage elicited praise when served under an assumed name, and was declared by the same people to be of an inferior quality when submitted under its true colours.

Moreover, the excessive prices charged for colonial wines all over the country also militate against a widening consumption, particularly with the descendants of a race which for centuries has accustomed itself to the fermented and distilled product of grains. The influence of these conditions as an obstacle against the development of colonial viticulture in the most desirable direction is, however, small in comparison with the influence arising from the indifference too often still shown by local producers in regard to the quality of their product.

The favourable climatic conditions at the Cape make it possible for every landholder or occupier of average intelligence to produce a crop of grapes. But how many are conversant with the ins and outs of dealing in the most rational manner with a crop after it has been gathered? And how many are imbued with an ardent desire of producing such wine?

We in South Africa fail singularly in applying skill in the art of wine-making just at a stage when such skill is mostly required to successfully accomplish for what we have been patiently working for a whole year. As matters are at present, we are so far from having a recognised uniform system of making wine that many farmers have each their own way of procedure, priding themselves sometimes as the possessors of a valuable secret which must be jealously guarded. In consequence, wines are produced in the same district at great variance in regard to quality and uniformity of character.

To overcome this state of affairs it is primarily important that some system should be adopted, and that for this purpose stress should be laid on collecting and recording local experience relating

to process of vinification and maturing of wine. For the system of wine-making could in the nature of things not be the same everywhere, but would vary with the description of wine most suitable to the conditions of a district. When once a beginning has been made farmers should be instructed as to the most suitable treatment of wine for any such period as wine may be under their charge, and it would then remain with the producer to strictly and conscientiously attend to it. As an additional factor, tending towards spreading technical education on the question of wine-making, I would recommend to growers to bottle annually, for their household requirements, the necessary quantity of their own wine, allowing sufficient time to elapse until such wine is sufficiently matured, *i.e.*, until it does not turn cloudy after bottling.

At present, the average wine-farmer has very little conception as to the quality his wine may ultimately develop, and he is often the worst served person in regard to a supply of wine for domestic purposes, contenting himself with either over-fortified or sometimes highly acidified wines. Assuming that farmers adopted that plan, it would necessarily teach them what natural wine really means, and the use of such wine would more and more create a desire to produce from year to year the same quality.

Much has already been accomplished in this direction, as all acquainted with the recent history of Cape viticulture must admit. Since a period of approximately fifteen years, the strong, fortified, spirituous sweetish wines, once generally in use, have been largely superseded by natural wines; the value of our Hermitage and Drakenstein wines has been established and the consumption of Colonial wines by the better classes has increased, a practical proof of the quality of our wine gaining sufficiently under proper treatment to secure it the position it deserves.

With these achievements to look back upon, one would think that further progress was but a matter of a short period of years. Unfortunately, this appears not to be the case, as, in accordance with past experience, there are not a few producers still who keep themselves entirely aloof from the experience of others and prefer to be guided by their own.

Though it must be admitted that each man knows as a rule his own business best, and that he is wise in displaying a certain amount of conservatism as to the management of his own affairs, his conservatism is unquestionably carried to the extreme when an attitude is taken as afore described. Maybe, that with the Colonial farmer this is mainly the outcome of an isolated life for generations, but one thing is certain, namely, that he, in his own interest, should be induced to make a change and be made to realize that, to further the interests of the industry on whose progress he largely depends, he should take more cognizance of what is going on.

It is the absence of a combination or co-operation, imbued with the earnest desire of promoting and representing in and out of season the interests of viticulture so sadly neglected of late, that is

mostly felt, and it is to be hoped that all those interested in viticulture will exert themselves to bring about a combination of that nature in the near future.

C. MAYER, Agricultural Assistant.

Stellenbosch, July 6th, 1902.

Co-operation in Viticulture.

CO-OPERATIVE WINE CELLARS IN GERMANY.

On the 10th of August, 1899, the small town of Ahrweiler, in Rhenish Prussia, celebrated the foundation of an institution which had for the people of the district more importance than most political events. It was the twenty-fifth anniversary of the first co-operative society of vine-growers (*Winzervereine*).*

The Government representative who attended these popular rejoicings (the Imperial councillor, Heising) did not consider it derogatory to express personally his good wishes in the humble cottage of F. H. Mies, the first and only president of the *Winzerverein* of Ahrweiler.

This showed that the Government and public of Prussia understood the importance of the co-operative movement, of which the vine-growers of the Ahr valley were the initiators in European viticulture.

On this occasion we would like to sketch the history and progress of this original application of co-operative principles, as studied during a visit to this fine region, not enough known to the viticultural public, and which has afforded a fine object-lesson to Germany, Austria, Italy and France.

According to F. C. Huber, co-operation was first given a trial in 1850, in the Moselle, Wurtemberg, and the Duchy of Baden, at the time when Schulze-Delitzsch, the celebrated founder of People's banks, already so widely spread throughout Germany (4,500 were in existence in 1892), endeavoured to promote throughout the rural masses a general movement of economical organization. Although lecturers had publicly taught these principles in the Ahrweiler valley, the first conception of co-operative viticulture seems to be due to a small grower of the district, the sexton of the village, named Kossmann. It was in 1868 that, in this small parish of Ahrweiler, one of these *Winzervereine* (which are so often met with to-day, grouped two or three together) was definitely established with 50 shareholders.

* *Winzervereine*. Wine-growers' Union.

It is hard necessity—this strong stimulant of energy—which accounts for the sudden awakening of the rural population to the benefits of organization.

For a long time the vine-growers of Ahrweiler had lived a quiet, monotonous existence. The Revolution of 1814 had enriched them, as the result of their annexation by France, through the division of the properties of the Chapters and Abbés hitherto their masters. They sold their wine without trouble to consumers and wine-buyers, who visited them to purchase their excellent red wine, the best in all Germany (Walporzheimer).

The climate of Ahrweiler is very severe and rigorous for a plant so delicate as the cépage, exclusively cultivated there (Spatburgunder or Pinots of Bourgogne), and cultivation is very expensive. The traveller notices it when driving through the narrow valley which the Ahrthal River has cut through the granitic and schistose plain of Eifel, in the cañon, ten miles long, where the towns of Ahrweiler, Walporzheim, Marienthal, Dernau, Mayschosz and Altenhar are lying. We are here on the northern geographical limit of vine culture (50° N); spring frosts, summer rain, and autumn frosts are to be feared, and the vines can only grow on the sheltered slopes of the hills. But these slopes are veritable ravines with steep land-slips, where cultivation is only possible by arranging the soil in terraces, which, numbering 20 to 40, are formed like the narrow steps of a gigantic staircase. Here the vine-grower plants his vines, although he has scarcely enough room to stand. Such exceptional conditions require an enormous outlay of money; and it is only by selling the wines at high prices that vigneronns could make a living.

With the inauguration of railways, the German markets were flooded with common wines from other parts of Europe, and prices rapidly came down. At the same time a transformation took place in the habits and customs of consumers and of commerce generally. The former, being visited regularly by commercial travellers, ceased to purchase directly from the producer, and wine merchants, widening the scope of their business, began to buy the grapes from vine-growers and make wine themselves, finding a greater advantage in fermenting, handling and maturing their own wine. The vigneronns were at first attracted by this new custom, which gave them the price of their labour directly their grapes were ripe, and relieved them of the burden of making and keeping their wine.

For this reason many of them gave up making wine and building fermenting houses or cellars, and, little by little, lost even the knowledge of vinification. In this state they remained defenceless against the middlemen and dealers in whose hands they were. Year by year the price of grapes became lower, until in years of abundance it was not even sufficient to pay the cost of culture. In 1860 a state of poverty and famine became general throughout the Ahrweiler district. Many small growers were bought out and left the country; some had to go and work in the iron foundries of

Westphalia, and others were attracted by the delusive Eldorado of America.

"Weinland arm Land!" wrote Von Groote in 1865, in his statistics of the Ahrweiler district. At Mayschosz the price of a pound of Pinot of the very best quality had fallen to about 18 pfennigs (about 2d.). The remaining wine-growers then resolutely united, and combined to work more economically and to better advantage. They triumphed in the struggle, but not without organization and great sacrifices.

The history of the beginning of the Altenhar Co-operation Society, written by Dr. Wygodzinski, gives an idea of the great efforts required on the part of the vine-growers to struggle against local competition. One day all the credit of the society was suppressed, and the shareholders were asked to pay, within 24 hours, the money advanced by a neighbouring bank. The board of directors immediately called a general meeting of the shareholders, and requested they would all contribute to make up the amount required. Next morning they all brought sufficient cash to save the society from bankruptcy. The Winzervereine are now out of the hands of banks; they are their own banks, their cellars are luxuriously built with cafés open to the public, and they have immense storing rooms with millions of bottles, and thousands in their reserve funds. They have commercial travellers all through Germany, wine shops in Cologne, Bonn, and other neighbouring towns, and thousands of customers to buy direct from them.

There are now 25 co-operative societies established in the valley of the Ahr (three at Ahrweiler, with respectively 150, 80, and 50 shareholders; two at Dernau and Altenhar, known under the synonyms of Winzervereine and Winbauvereine).

Their shareholders, all very small proprietors, realized that the best means of remaining masters of their own industry, as well as of improving their economic education and technical knowledge, was to place at their head only vine-growers elected amongst themselves. These societies have formed a central federation at Ahrweiler; and it is a small vine-grower, the father of F. H. Mies, who directs and controls millions of capital representing one of the most powerful co-operative agricultural federations in the world.

Co-operation has not only assured prosperity to the peasants of Ahrweiler, but it has also become a school of administration, organization, and economic self-help.

To give an idea of these societies we cannot do better than to describe the Central Society of Mayschosz, which is a type.

According to the regulations of this society, its objects are—"To sell only wines made in its own cellars from grapes supplied by the shareholders themselves, and also to sell the transformed by-products of vinification."

Contrary to what has taken place elsewhere, most of the societies were formed with money advanced exclusively by the supplier shareholders, the capital being usually divided into shares of 50 marks

(£2 10s.). Many had to put by their yearly profits, for many years, to pay back the capital borrowed from the banks or others; but many have now become complete proprietors of their cellars and plant. Such is Mayschosz.

These companies are established on the principle of unlimited liability, which develops in the shareholders the sense of responsibility, discipline, and self-help in the interests of all. It is the surest condition of success to viticultural co-operative societies, as well as to People's banks. Each shareholder is responsible, in his own real estate, for the losses sustained by the society; therefore, everyone is strongly stimulated to work to avoid them. The great success of these Ahrnthal societies is simply due to this principle of unlimited liability. Another cause of success is the absolute honesty of the commercial operations. They all furnish to the consumer wine of authenticated origin and guaranteed purity and soundness.

"All the shareholders must supply, at vintage time, the whole of their red grapes, non-stemmed." At Mayschosz, the 150 shareholders, representing 288 acres of vines, bring annually about 300 tons of vintage, yielding 35,200 gallons of wine. As the yearly sale of this society is greater, it is obliged to buy 6,600 gallons of wine from neighbours, who, it is hoped, will soon join with the co-operative movement. The price of the grapes is paid to the shareholders at delivery, or by fractions at very short intervals. It is fixed annually by the committee, and is as near as possible to the market value of the grapes. Five per cent. is taken off the price of these grapes, and goes into the *Eventual Reserve Fund*, divided into proportionate shares, of which the shareholders remain titular. This fund is the basis of the profits and losses account, resulting from the sale of wine and by-products. With this object, the amount of the *Eventual Reserve Fund* of each of the shareholders is retained during the last three years. In the case of profit the fund is divided proportionately and paid as bonuses. In case of losses, the money is first taken from this *Eventual Reserve Fund* before asking the shareholders to participate in those losses.

The main practical difficulty is to value the difference in the quality of the grapes. With this object the price fixed annually only applies to Burgundy, exclusive of Portugais bleu, Fruhbürger, Kleinburger.

The grapes of given varieties are valued according to the richness of their must in sugar (measured with the glucometer of Oechsle) and some years also by their acidity. An average percentage is established for the season; for each degree above it a pfennig is added to the fixed price of each lb. and deducted in the other case. By this means the vine-grower is stimulated, for it is his interest to carefully work his vineyard, and help the grapes to reach perfect maturity. In other localities where the soils vary, the different sites are taken into account; but everywhere unsound grapes are refused. The wines, made and matured by the society, are then sold in bulk to merchants, by auction at fairs, directly to consumers, or again in

cafés or restaurants (Gartenwirtschaft) belonging to the Winzervereine, and established in many large towns. The society has a large stock of wine in reserve, and notwithstanding the difference in yields and qualities, which naturally varies every year, it is always able to furnish the consumer with wines equal in quality and belonging to a certain constant type. The profits are annually divided at a general meeting of the shareholders, and a certain proportion (generally 10 per cent.) is taken from the profits to form the "reserve fund" of the company. This "reserve fund" may be done away with when the society has paid all its debts. Many societies are now utilizing it to buy blocks of vineyards as they come into the market; and if we judge from the number of sign-boards bearing the term "Winzervereine" which together with those of other proprietors disfigure the beautiful scenery, we see that the co-operative proprietors will soon buy out those that remain outside the co-operative movement.

The administration of the Winzervereine comprises four distinct bodies—the Committee, the Board of Verification, the Board of Supervision, and the shareholders generally.

The "Committee," composed of the president, vice-president, secretary and treasurer, is elected for three years, and is responsible to the society; it manages the business under the direction of the president. The president supervises the staff, the sale of wines, &c., and is paid 1,000 marks (£50) per annum; the secretary receives 1 per cent. of the price of the sales effected. At Mayschoz, the staff of the cellar is composed of a cellarman, two coopers, and two workmen; but during the wine-making season the society employs 30 men daily. As there is not much work in the field at that time of the year, many of the shareholders are employed, so that co-operation not only benefits in working to the best advantage the produce of the district, but it also helps workmen in obtaining benefits not to be procured in any ordinary factory.

The "Board of Supervision" is composed of three members, elected by the shareholders from amongst themselves, excluding those already on the committee. It controls and supervises the committee, and is empowered to suspend any of its members, pending the decision of the general body of shareholders.

The "Verification Committee," composed of three members, together with the president, verify, classify and value wines.

The "Shareholders" hold two meetings yearly, one in spring and the other in autumn, at which each shareholder, irrespective of the number of shares held, has one vote. At the latter meeting the balance-sheet is submitted and new members elected.

What are the practical results of these associations? They may be summed up in one word—"They have saved the vine-growers of Arththal from ruin, and brought back comfort and prosperity to all the villagers of the district." They have all succeeded; the experience of those first established serving to help the more recent ones. Moreover, to increase their strength these societies have

federated, and the president of the Central union, controlling the local committee, has the power of having the wines of each society analyzed to verify their soundness and to suppress fraud and adulteration.

The humble society of Mayschosz has now become one of the richest agricultural federations. It paid for grapes in 1868 sixteen pfennigs per lb.; last year it paid 30 to 40 pfennigs (5d.) The wine is sold at an average of 1 mark 50 pfennigs per litre (10s. 6d. per gallon); its stock of wine represents a value of £40,000, buildings £10,000, and plant £3,750; finally, the vineyards represent a value of £20 per acre.

The number of shareholders in July, 1897, was 126; and in July, 1898, 146, all vine-growers.

Good example is contagious. The co-operative movement which started in Ahrthal has since spread to Germany, the valley of the Rhine, Austria-Hungary, Switzerland, Italy, and is rapidly increasing at the present moment. Its application is extended enough, and its general experience varied and complete enough to allow all viticultural regions, however different may be their local conditions, to find either in Germany or Italy examples appropriate to their particular wants. Countries where property is small and subdivided, where the yield is small but the value of the wine great, might follow the example of the valleys of the Ahr and Rhine, in Germany. Countries having a large production of common wines might follow the example of the Po Valley in Italy.

CO-OPERATIVE WINE CELLARS IN OTHER PARTS OF THE WORLD.

The co-operative wine manufacturing cellars of Europe may be divided into five groups. 1st, the Rhine; 2nd, Germany; 3rd, Switzerland; 4th, Austria-Hungary; and 5th, Italy.

1st. The *Wintervereine* of the *Mittelrhein* (Middle Rhine) are all more or less copies of the Ahrthal type. They spread all along the Middle Rhine; from the vineyard of Sichenbirge at Koenigswinter and Linz up to Bingen, the celebrated bend in the river, in front of which are the famous vineyards of Rheingau. Many of these co-operative societies, like those established in the Moselle valley, are backed by the union of rural banks of Raffeisen and Neuwied.

2nd. In *Sueddeutschland* (South Germany) these societies, more varied in form, are met with in Wurtemberg, Weinsberg, Unterturkheim, Beilstein, &c. The most successful is that of Heilbronn, created with the material and moral help of the municipality; it has established auction sales, where wine is sold per hogshead, and which are now frequented by the hotel-keepers of the region. The movement of co-operative association has recently extended to the Duchy of Baden, on the shores of Lake Constance. In

Bavaria and Alsace, six co-operative cellars have been recently established in the most renowned crus of Ribeauville, Wolzheim, Eguisheim, Guebwiller, &c. On the 1st of January, 1899, an institution of a new type was opened at Colmar—the “Bourse aux Vins” (wine market). It was founded by 150 of the principal vine-growers of Alsace, with the object of making the public directly acquainted with the excellent natural wines of Alsace, and of fighting against the increasing sophistication encouraged by the law of 1892 allowing the addition of sugar to the vat. A board of wine-tasters examines the wine put up for sale, and that which is accepted is sold by the “Bourse” under its guarantee and stamp. The wine is sold by public auction or by agreement, the best samples being retailed to one of the finest and most important cafés of Colmar, which is connected with the Bourse.

- 3rd. In Switzerland œnological societies have been established since 1872 in the Valley of the Rhine, at Sion, St. Maurice, Vetro, Granges-Lets, &c. They generally sell their wine in bulk; and often even their must. According to Rocquigny, “with the object of dividing the profits amongst the shareholders, a normal price is fixed for grapes; one that can be eventually increased by a bonus paid on three co-efficients: situation of the vineyard, mode of cultivation, and the weight of must in saccharine matter. It is said that the œnological societies of the Valleys give to their shareholders a profit of 25 to 30 per cent. above the price obtained by vine-growers remaining outside the society.”
- 4th. In Austria-Hungary there are established under the name of Kellereign two groups of societies resembling those of Ahr. One in the region of Siebenborgen (Transylvania), which seems to have spread in Russian Bessarabia; the other in the Tyrol, where, since 1892 (thanks to the active propaganda of Dr. Mach, the learned œnologist and director of the Agricultural Institute of San-Michele), over ten societies have been established; in Neumarkt, Andrian, Terlau, Auer, &c. Following their example, Bargo, Riva, Rego, in Italy have established co-operative cellars. Like those of Germany they are backed up by the People's banks, whose auditors inspect their accounts. As in Italy, they have the moral support of the Government.
- 5th. In Italy the “Cantine sociale” are of two types; some purely co-operative, that is to say, composed of “supplier shareholders” only, and which work solely in the interests of the vine-growers who supply them with grapes; others are composed of supplier shareholders and others who supply the capital. The oldest is that of Sondrio, established in 1872, with a capital of £16,000, divided into £5 shares, in order to take the local wine-growers out of the

hands of the Swiss wine merchants, who were the only buyers of wine in that region; but it was only after the cessation of commercial relations between France and Italy, in 1882, that the co-operative movement spread all over the Peninsula. It was only then that the Italian Government, by a series of competitions, where upwards of £1,000 was distributed in prizes, and by the active propaganda of its best professors, such as Cava/zi, endeavoured to establish co-operative societies all through Italy. Their object was to make a wine of a constant type and of high qualities which was to be sold, either to wine merchants in Italy, or exported direct to Germany and Austria. Among the societies we may mention the *Società enologica valtellinese* of Sondrio, the *Cantine sociale Pestellini* of Bagnò, the *Unione viticola* of Brindisi, the *Società viticola* of Verona, the *Unione enologica di Ripatransone* of Ascoli, which treats over 1,000,000 gallons a year, and the *Cantine sociali d'Oleggio*, of Porto Ferrago, of Strà, Barbaresco, &c.

In France the title "co-operative" has been used by producers and merchants on the South and Bordeaux region, but rural co-operative societies are very rare. They do not seem to have succeeded as well as those in other European countries. Up to the present we only know of one society which deserves to be called "co-operative"; it is that of Damery, which actually sells 100,000 bottles of champagne per annum. This was the result of a vast scheme of a socialistic character, which a very young man (R. Lamarre) attempted to create in 1890, in order to form a coalition of 25,000 vine-growers of champagne against the other large manufacturers of sparkling wine.

To sum up, the co-operative societies actually in existence, and which are working successfully in Europe, number about 100 in the German countries, and 50 in the Latin.

We do not under-estimate the difficulties attending the creation of such societies in the vine-growing regions of Australia; but as even greater obstacles have been surmounted in Europe, and as a successful start seems to have been made by the Mooroopna Winery Company in our own State, it is to be hoped that circumstances similar to those which induced the wine-growers of Ahr to unite and co-operate will take place here, that amongst our wine-growers someone will follow the example of Kossman, Josten and Mies. May the experience of foreign countries serve as a guide, and the new difficulties arising from the extended discovery of phylloxera, and the present state of the wine market, be overcome by a practical and sound application of co-operative principles to minimize individual expense, and assist the annual production of large quantities of sound wines of constant and uniform types.—R. DUBOIS, B.Sc., in *Agricultural Journal of Victoria*.

ENTOMOLOGY.

Potato Tuber Moth.

The following letter of enquiry respecting the ravages of the Potato Tuber Moth and the memorandum thereon by the Government Entomologist are published for the information of our readers :—

I had some potatoes taken up three weeks ago. At the time I noticed nothing the matter with them. A few days ago my attention was drawn to them, and I found them being eaten by a worm which burrows some distance beneath the skin. I took up some more and I found them also affected though not to the same extent; and I found some in a neighbour's garden affected too. By parcel post I am sending you samples; they are from imported seed planted about Christmas.

I shall be glad if you can tell me of the nature of the disease, and what can be done to stop it. Judging from the destruction wrought in those lifted three weeks ago it would appear impossible to keep potatoes so affected during the winter.

W. S. P.

Lady Frere, June 28th, 1902.

Half a dozen complaints of the nature of the above have been received during the last few weeks, and the inference is that the Potato Tuber Moth (formerly *Lita solanella* now *Gelechia operculella*), for such is the name of the insect causing the damage, is more than usually prevalent this season. It is by no means a new pest in the Colony, having been long known about the principal ports and having been received from or observed in many inland districts by the writer during his seven years' experience at the Cape. Very likely it occurs in most if not all the districts. The late Mr. W. van der Byl, of Constantia, once told me he distinctly remembered it near Cape Town before 1875.

The insect, with little doubt, is one of our numerous pest introductions from other lands. It was known as a potato pest in New Zealand and Tasmania nearly half a century ago, and is thought by some to be native to the former country. Others, however, suggest the interior of Africa as the original home. For over twenty-five years it has been injurious in Algeria, and probably it is widespread in parts of the south of Europe. Shipments of potatoes from Lisbon to the Cape have on several occasions been condemned on arrival because of the pest, the moths in one case emerging in immense numbers from the ship's hold when the hatches were raised. America, too, has the pest, though not badly in most parts because of the severe winters. Occasionally the Californian rural papers allude to it, the *Pacific Rural Press* in 1897 saying it was a "great pest almost everywhere in the State." The original description of the

insect, made in 1873, is said to have been from specimens collected in Texas, and since 1881 at least the Californians have lamented on "wormy" potatoes. The mainland of Australia has known the insect thirty years or more, and, finally, the Natal farmers are quite familiar with its work.

Being known as an injurious insect in so many countries, much has been said and written about it; and it is largely published accounts that form the basis of the present notes. The most recent and complete account of it is a bulletin entitled "The Potato Worm in California," by Warren T. Clarke, published last October by the University of California Experiment Station.

The adult insect is a small moth. As one sees it at rest it measures very close to two fifths of an inch in length. The fore wings, which when folded cover most of the body and therefore give the general colour impression, are brownish with obscurely outlined darker markings; the hind wings are almost white, but they are hidden from sight except during flight. The moths become abundant in spaces where infested tubers are stored, and are common in affected potato fields about the time the tubers are ready for digging. They normally fly after sundown, but they may be started up from the plants at any time of day into a quick low flight.

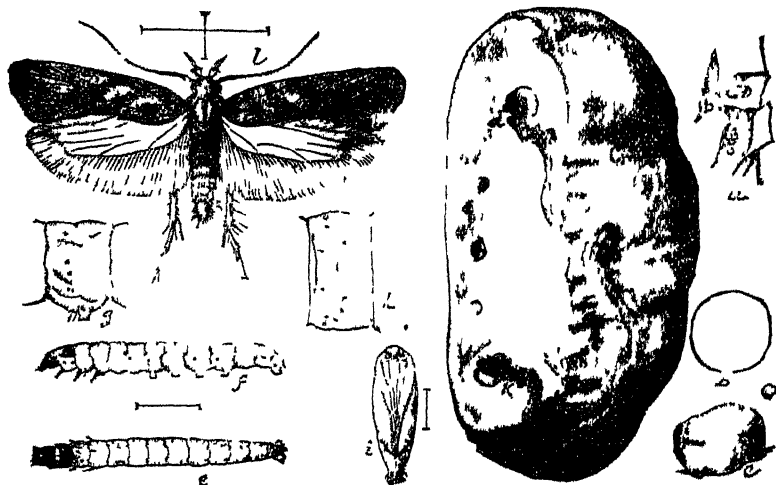
The very tiny, white, oval eggs are laid a few at a time in sheltered situations, as alongside a vein of a potato leaf in the field or in the eye of a tuber in the storehouse. They hatch in seven to ten days, and the young larvæ proceed at once to mine into the leaf, stem or tuber as the case may be. The long winding burrows, filled with brownish excrement and often the starting places for decay, are conspicuous in affected tops and tubers. The full grown larva or caterpillar (or "worm" as the American farmer will have it) measures a trifle under half an inch in length. It is sordid white in colour, often more or less pinkish toward the front and on the underside, and has a dark brown head and "neck"; sometimes there is a tinge of yellow or green to the white parts.

From six to nine weeks, according to the season, is required for the growth of the larva (Clarke). It then comes out of its burrow and spins a silken cocoon within which it changes to a pupa. The cocoon is made in any convenient cranny, frequently in the eye of a tuber, and is coated outside with particles of dirt or excrement. The pupa within is deep mahogany in colour and about one quarter inch in length. After fourteen to sixteen days (Clarke) the moth emerges, and within a few days it provides for the continued existence of its kind. There are probably at least four generations a year in warm climates like that of the Cape.

The Potato Tuber Moth is not confined to potatoes. It is well known in almost all countries where it occurs as a tobacco pest, and thus has earned popular designations as "Tobacco Leaf Miner," "Tobacco Split Worm" and "Potato and Tobacco Moth." There is not much complaint of damage by it to tobacco in this country; but it works in tobacco leaves and stems with us, and if our tobacco were

to be used for cigar wrappers, the injury done might be sometimes considered serious. Mr. Colin Story, of the Government Agricultural School at Elsenberg, tells me the insect was quite common in tobacco on the college farm during the past season, and that he also found it in "Stinkblaar" (*Datura stramonium*). In the United States (Howard, 1898 Year Book) there is record of its attack on horse nettle (*Solanum carolinense*), tomato and egg plant in addition to potato and tobacco.

The injury to potato tops, though sometimes rather serious, is of far less importance than the injury to tubers. The tubers may become infested while they are still in the soil, or after they have



POTATO TUBER MOTH. *a*, a piece of tuber with eyes, deposited about the eye; *b* and *c*, egg greatly enlarged, *d* and *h*, tunnelling of larva in tuber; *j*, pupa at end of burrow; *e* and *f*, the larva, *i*, the pupa, and *l*, the moth, all three times natural size; *g* and *h*, an abdominal joint of larva from the side and top. (From U.S.A. Dept. Agric. 1892 Report.)

been dug or stored, and the injury may continue with generation after generation of the insect until they are reduced to a state of utter putridity. The infestation of potatoes in the ground may begin from eggs laid on exposed or almost exposed tubers or from partly grown larvæ working their way downward through loose soil from drying tops. Farmers in the older infested districts of the Cape know by experience the grave danger of leaving dug potatoes exposed on the land overnight. Not only do such tubers receive eggs from moths that may chance to be in readiness, but larvæ leave the no longer nutritious tops and are quick to take advantage of the opportunity for a new lease of life unintentionally opened for them.

The principal measures for controlling the ravages of the Potato Tuber Moth are preventive in character. Careful compact "hilling" makes it impossible for both larvæ and moths to find their way to

tubers in the ground, whereas careless hilling, especially with lumpy soil, and too shallow planting if flat cultivation is practised, invite infestation. Digging should be commenced without delay when the time comes, and the tubers should be removed from the lands as soon as possible after they are up. The risk of infestation begins as soon as they are exposed and rapidly increases as the sun sinks. If immediate removal is impossible they should be at once bagged and the bags stacked together and closely covered. The store places should be entirely free of old infested potatoes and moths, and to this end should be thoroughly cleaned out before digging time. Having stored the tubers free of the pest in clean surroundings, measures should be taken to prevent moths gaining access to them. Various means are in vogue. Some farmers cover with bagging, others with sand or fine dry earth, others with straw, and still others with straw and bagging. The insect can get from one bag of potatoes to another, so if bagging is used as a cover several thicknesses of good quality stuff should be taken. In Constantia a certain veld bush is esteemed as a cover. In the same district it is said that a weekly sprinkling of potato heaps with water suffices to greatly retard damage, and that the presence of guano near by has the same effect; but I cannot vouch for the reliability of these claims. The infested potato tops, which are recognizable at a glance, may be cut and removed a week or so before digging is commenced, and thus the larvæ, that if they were to remain might get to the dug tubers later, be practically eliminated. Clarke recommends the removal of infested parts of the tops early in the season in order to check the multiplication of the insect.

The insect is most common out of doors in the late summer. There appears to be no hibernating state to carry it over from year to year, and, presumably, it is necessary for it to spend the interval between potato crops either in stored tubers or in other solanaceous plants that may be growing in the interval. Probably stored tubers are mainly relied upon, as where there are two crops of potatoes as in Constantia, the winter one suffers very little in comparison with the summer one. One should protect stored tubers, then, not only for the value of the tubers themselves but to diminish the number of moths for the ensuing summer, and any worthless potatoes should be effectually destroyed, not left around to breed the pest. Similarly no waste tubers nor infested tops should be left on the lands after the removal of the crop unless sheep or pigs are to be turned in to feed on them. Infested seed potatoes are said to generally make growth, but it seems an act of folly to plant such seed and thus jeopardize the new crop.

Insecticides are little used to control this insect. The use of carbon bisulphide to destroy moths and pupæ in stored tubers is recommended by Clarke. For its employment to advantage the potatoes must be in tight rooms or bins, and (according to Clarke) five treatments, one when the tubers are first stored and the others at fortnightly intervals, are advisable. One and a half pounds at

each treatment to every one thousand cubic feet of space is suggested, and it is stated that the vapour diffuses readily through the bags and amongst the tubers. But this fumigation remedy is very unlikely to become popular in South Africa; before it does the bisulphide must become much cheaper and more easily procurable with us, and the potato growers must forego storing the potatoes in lofts as is now the general practice. Spraying with Paris green to destroy larvæ on potato and tobacco tops has been recommended by several writers, but it is a measure of doubtful utility because of the burrowing habits of the creatures. It is worth testing where serious injury is done to tobacco; the very young larvæ may be poisoned as they first eat their way into the tissues, and older larvæ that seek to make new burrows may get caught. The moths fly to light readily, and "lamp traps" consisting of bright lights over pans of paraffine oil are worthy of trial. In France acetylene lights have very recently come into use against a certain moth pest of the vine, and are said to be answering satisfactorily; an average of one light to every half acre is employed. But in general the simple preventive measures outlined are all that is necessary to ensure immunity from this potato pest and hence there is no need to worry about spraying, fumigation and lamp traps.

CHAS. P. LOUNSBURY, Govt. Entomologist.

COUNTRY REPORTS.

Bizana.

MAJOR H. SPRIGG, R.M., 11th June, 1902.—The month has been dry on the whole, although rain has fallen on several days. Stock are doing well and pasturage good for winter. The harvest is very patchy, hailstorms and grub having entirely destroyed some crops. I think the price of grain will be considerably higher than last year.

East London, Ward 3.

T. WILLOWS, F.C., 1st July, 1902.—The exceptionally long drought has been followed by one of the best and most soaking rains that has fallen in this part of the division for years, especially during the month of June, and full advantage has been taken to utilise it to the best advantage for ploughing and sowing. The veld is improving and has a bright appearance for this season of the year; water is also plentiful and stock in fair condition.

Elliot.

J. P. CUMMING, R.M., 31st May, 1902.—The drought still continues. Very little ploughing has been done, and there is nothing specially to report upon.

Flagstaff.

J. H. ROOSE, R.M., 3rd June, 1902.—Winter has now fairly set in and the natives are all busy reaping their crops of mealies and Kaffir corn. The harvest this season is considered a very good one. All classes of stock are looking well and the district is free from disease. Pasturage, although beginning to look dry, is in some parts still very good.

Fort Beaufort.

B. BOOTH, 3rd July, 1902.—On the 9th, 10th and 11th of last month there was a rainfall of 2·74 inches, with a heavy fall of snow on the Winterberg, which caused considerable loss in stock. A good deal of ploughing has been done during the month. Harvesting is now going on, mealies only half crop, Kaffir corn and beans good. Stock keep up in condition and no disease has been reported. —

Kentani.

N. O. THOMPSON, R.M., 3rd June, 1902.—During the month hardly any rain has fallen and the country is looking dry. The crops have proved very bad, and it is certain there will be a great scarcity of mealies during the next six or eight months. This failure of the mealie crop is due to locusts, destruction of the early crop by worm, and want of regular rain for the late crop. Stock on the whole are looking well. Cattle are in great demand; cows, heifers and oxen all finding ready sale at very high prices.

Kokstad.

W. P. LEARY, ACTG. R.M., 31st May, 1902.—The month of May was unusually dry, but was rather warm for the time of the year. The nights were frosty and a high wind raged for a couple of days, which had the effect of drying up the veld. From all reports stock are in good condition, and there is ample winter feeding on the farms to last through the season. Lung-sickness amongst the cattle is now happily of rare occurrence owing to the quarantine regulations being strictly observed in infected areas. The chief centre of the disease is the town itself, which has now been under quarantine for four or five months. Only a few cases, however, have recently occurred, and it is confidently expected that the disease will be stamped out within a short time. Anthrax or Miltziekte broke out amongst a flock of sheep on the farm Mill Grange, from which a number succumbed. The outbreak was taken in hand by the Veterinary Surgeon and the entire flock quarantined in a suitable paddock. This precautionary measure proved successful

in so far as the disease was confined only to that particular flock. The advent of the cold weather has caused an abatement in the outbreak. A flock of sheep on the farm Mansfield was reported to be scabby, but otherwise the district seems to be clear of this disease.

Libode.

J. C. GARNER, R.M., 31st May, 1902.—I have nothing of importance to add to my report of the preceding month. The natives are still busily engaged in harvesting operations, and I fear the yield will not prove quite so good and abundant as was anticipated earlier in the season. The weather has been dry and cold with very slight frost occasionally, and very little rain has fallen. Stock of all kinds are in as fair a condition as can be expected for the time of the year and there is no disease amongst them. The district is now entirely free from lung-sickness.

Lusikisiki.

C. W. CHABAUD, R.M., 31st May, 1902.—During this month grass-burning on an extensive scale has been carried on by the Pondos. The winter has set in and will soon make itself felt among stock at a distance from the coast. Mealies are being brought in for sale by the Pondos, but in very small quantities.

Maclear.

J. S. SIMPSON, ACTG. R.M., 2nd June, 1902.—The district is suffering from drought and numbers of farmers are moving their stock coastwise for pasture. The oldest residents do not remember so dry a time for this period of the year—in some parts of the district there has been practically no rain for three months. High and cold winds have prevailed during the month which have dried up the veld. The outlook for winter crops is not favourable. Small stock are still in fair condition, but large stock have fallen off very considerably.

Matatiele.

J. F. REIN, R.M., 23rd June, 1902.—The weather during the past month was cold and dry and favourable for the gathering in of crops. A few cases of redwater and lung-sickness were reported and the herds quarantined. Stock are looking well so far.

Mount Ayliff.

H. H. BUNN, ACTG. R.M., 31st May, 1902.—The natives are taking advantage of the clear fine weather to get in their mealies and Kaffir corn. The yield of both grains is pretty good, though not as good as was hoped would be the case some months ago, a worm having played havoc with the mealies in some of the lands. There has been some beer drinking, resulting in a few broken heads, and while the corn continues plentiful there will be more. Winter crops are almost entirely neglected, partly owing to the difficulty experienced in keeping stock out of the unenclosed lands. A good deal of damage

to pasture land has been done by grass fires, the origin of which it is difficult to trace. Generally the veld has a wintry aspect, and with the sharp frosty nights cattle and horses are putting on their winter coats.

Mount Frere.

H. B. GARNER, ACTG. R.M., 31st May, 1902.—I have nothing to add to my last month's report.

Mqanduli.

L. FARRANT, R.M., 3rd June, 1902.—The harvest has just commenced, and I regret to say that the prospects of even a fair supply of grain are poor indeed. I notice the natives themselves are keenly alive to the necessity of seeking employment with a view to securing food for their families. Stock of all kinds are healthy and in good condition for the time of year. Locusts are along the coast, but cannot now do much harm as little or no wheat or oats is grown here.

C. GLADWIN, ACTG. R.M., 5th May, 1902.—There is nothing of any consequence to report during the past month, which has been very dry, and at times the heat was very intense. Rain fell towards the end of the month. Stock are looking well and no diseases of a severe nature have been reported. Locusts have not made their appearance in this district.

Ngqeleni.

W. F. C. TROLLIP, ACTG. R.M., 3rd June, 1902.—During the past month all the lands near the coast have been reaped, and the crops in that part, chiefly Kaffir corn, were very good, but those further inland sparse and not fit to be reaped yet. The want of rain is very much felt throughout the district. Two cases of what was first thought to be farcy were reported, but they have both turned out to be a sickness supposed to have been introduced by captured stock brought into the country. From what I can gather from the two cases which have come under my observation, the symptoms are very much the same as farcy. Lumps resembling farcy buds form on different parts of the body. These burst and discharge a thick yellow fluid leaving ragged sores, and there is a diffused swelling of the affected part, but there is no discharge from the nostrils and both the horses are recovering. These are the only two cases that have come under my notice, but I have been informed there have been outbreaks in other districts, though no horses have died from it. All other stock are healthy.

Nqamakwe.

R. J. MACLEOD, ACTG. R.M., 31st May, 1902.—The rainfall for the past month is 0.30. The veld is commencing to look dry owing to the scarcity of rain and winds which are prevalent at this time of the year. Cattle and sheep in some parts of the district are falling off, though in other parts they are still in fine condition. One case

of redwater was reported. The natives are busy reaping their crops, which are very poor this season owing to drought, and in some parts nothing will be reaped at all.

Qumbu.

B. WHITFIELD, ACTG. R.M., 2nd June, 1902.—The natives are busily engaged in reaping their crops of mealies and Kaffir corn. The yield of the former is not at all good but the latter is fair. Mealies are being sold at 15s. per bag of two hundred pounds weight. Rain has not fallen for some time and the country is looking very dry. Cattle of all kinds are in fair condition. A few cases of lung-sickness and redwater have been reported.

Tabankulu.

T. NORTON, R.M., 31st May, 1902.—Agricultural prospects are much as they were at the date of my last report, and as the weather is normal, there is naturally no change to note. Reaping has begun and grain is beginning to be brought for sale at the various stations.

Tsolo.

W. CARLISLE, ACTG. R.M., 5th June, 1902.—A large portion of the mealie crop in this district has failed through continued drought. Still sufficient grain will be reaped to keep the people from want. Kaffir corn is in abundance. Pasturage is now very bad for the time of the year and in parts the stock are falling off in condition. No disease amongst the stock reported.

Tsomo.

W. J. THOMSON, R.M., 31st May, 1902.—No rain has fallen at this station during the month; the country is looking very dry. Natives have started to reap the crops; the mealie crop I think will be very poor, but a fair yield will be harvested of Kaffir corn. Stock are on the whole in good condition. Only one case of redwater has been reported and the infected stock have been quarantined. No appearance of locusts as yet.

Umzimkulu.

CAPT. E. J. WHINDUS, R.M., 31st May, 1902.—There is little of importance to report with respect to live stock. Some of the transport oxen passing to and from Natal are showing the effect of poorness of pasturage along the road, but that is inevitable at this time of year. In one instance four oxen died from poverty and exposure after a night's sharp frost. All stock are generally in as good a condition as can be expected at this season of the year. The probable loss from grub (or blight) in the mealie crop is likely to be greater than was previously expected, and in some parts of the district only half or perhaps less of the average crop will be reaped.

Willowvale.

M. LIEFELDT, R.M., 31st May, 1902.—I have nothing to add to my report dated 30th ultimo on the above subject.

Artificial Manures.

The annexed list showing the agents from whom the various artificial manures may be obtained, and the current prices, is published for the information and guidance of agriculturists.

Full particulars as to the composition of the respective fertilizers can be obtained on application to the agents; and attention is also invited to the analyses published in the *Agricultural Journal* of 9th January, 2nd April and 11th June, 1896; 30th Sept., 1897; 27th Oct., 1898; 13th April, 6th July, 1899 and 18th July, 1901.

LIST OF FERTILIZERS.

Attwell & Co., Cape Town. (Agents for Alex. Cross & Sons, Ltd., Glasgow.)	Special Root Guano	..	£6	10	0	per ton of 2,000 lb.
	Potato and Grain Guano	..	8	5	0	" "
	Nitrate of Soda	..	12	0	0	" "
	Superphosphates 39/40 per cent.	..	6	0	0	" "
	Scotia Basic Slag (cont. 30 per cent. Tribasic Phosphate of Lime)	..	4	15	0	" "
	Sulphate of Ammonia	..	0	19	6	per 100 lb.
(Prices free on trucks, Cape Town)						
Jas. Searight & Co., Cape Town.	No. 1 Superphosphates	..	£5	0	0	per ton of 2,000 lb.
	(containing 12-14 per cent. Phosphoric Acid soluble in water, being equal to 26-30 per cent. Tribasic Phosphate of Lime).	..				
Jas. Searight & Co., Cape Town.	No. 2 Superphosphates	..	5	10	0	" "
	(containing 14-16 per cent. Phosphoric Acid soluble in water, being equal to 30-35 per cent. Tribasic Phosphate of Lime).	..				
	No. 3 Superphosphates	..	£6	0	0	per ton of 2,000 lb.
	(containing 17-18 per cent. Phosphoric Acid soluble in water, being equal to 37-39 per cent. Tribasic Phosphate of Lime).	..				
	Vine Fertilizers	..	9	0	0	" "
A reduction of 5s. per 2,000 lbs. is allowed on orders of 100 bags or more. Special rates can be arranged if delivery is taken ex importing steamer, the goods being trucked at Docks.						
Woodhead, Plant & Co. Cape Town.	Thomas' Phosphate Powder	£4	15	0	per ton of 2,000 lb.	
	Superphosphates	5	15	0		
	Nitrate of Soda	14	0	0		
	Muriate of Potash	16	0	0		
	Sulphate of Potash	16	0	0		
	Wheat Fertilizer	8	10	0		
	Kainit	4	15	0		
	Potato	1	15	0	per 200 lb.	
	Vineyard Manure	1	15	0	"	
	Tobacco Manure	1	15	0	"	
	Sulphate of Ammonia	1	2	6	per 100 lb.	
Subject to a discount for cash.						
De Waal & Co., Cape Town.	Jadoo Fibre	..	..	10s.	6d.	per bale of 100 lb.

White Ryan & Co., Cape Town.	Potato, Vegetable and General garden	£8 10s. per ton of 2,000 lb. If less than $\frac{1}{2}$ ton 18s. 6d. per bag of 200 lb.
	Pure Ground Bone	£6 10s. per ton of 2,000 lb. If less than $\frac{1}{2}$ ton 18s. 6d. per bag of 200 lb.
White, Ryan & Co., Cape Town.	Quick-acting Bone and Potash Mixture	£7 per ton of 2,000 lb. If less than $\frac{1}{2}$ ton 16s. per bag of 200 lb.
	Selected Bone Meal for Cattle, Horses, Pigs and Poultry ..	15s. 6d. per 100 lb. ; special price per ton.
	Bone Grit for Fowls ..	12s. 6d. per 100 lb.
	Superphosphates ..	Wholesale only.
Malcomess & Co., E. London.	"Malcomess" A. Fertilizer, for Potatoes, Mealies, Vegetables, Orange and other trees ..	£9 per ton of 2,000 lb.
	"Malcomess" B. Fertilizer, for cereals, especially wheat ..	£9 per ton of 2,000 lb.
	Accompanied by guaranteed analysis by Prof. Hahn ..	(less 5 per cent for cash).
James Flower & Sons, Cape Town.	"H.B.T." Gypsum	£3 10s. per ton of 2,000 lb.
	Pure Ground Bone Meal ..	£8 10s. (in bags f.o. trucks—Cape Town).
Government Guano :—	Ordinary Guano	£6 10s. per ton of 2,000 lb. or 18s. per bag of 200 lb.
	Rock Guano	£6 17s. per ton of 2,000 lb. or 18s. 9d. per bag of 200 lb.

For use within limits of Colony.

Price includes delivery at Cape Town Railway Station.

D. E. Hockly & Co., East London.	"Hockly's Special Fertilizer."] A complete manure for all crops]	£9 per ton of 2,000 lb. less 5 per cent for cash.
	Pure Bone Meal	Special Price.
J. G. Steytler & Co., Cape Town.	Phosphates or Basic Slag	£4 2 6 per ton of 10 bags each 200 lb.
	Superphosphates .. 4 12 6	" " "
	Dissolved Bone .. 6 7 6	" " "
	Grain Fertilizer .. 7 0 0	" " "
	Potato Fertilizer .. 8 0 0	" " "
	Vine Fertilizer .. 8 0 0	" " "
Henry Ries & Co. East London.	Agents for the Lawes Chemical Manure Co., Ltd., of 59, Mark Lane, London, who prepare fertilizers for them, which they sell at the undermentioned rates:—	
	Ries' Potato Fertilizer ..	15s. to 17s. 6d. per bag of 200 lb.
	" Special Dissolved Bone ..	8s. 6d. to 10s. " of 100 lb.
	" Special Cercal Manure ..	8s. 6d. to 10s. " of "
	" Ordinary ..	7s. 6d. to 9s. " of "

For the potato fertilizer they make a reduction of 1s. 6d. per bag on orders for 10 to 25 bags, 2s. on orders for 30 to 50 bags, and 2s. 6d. on orders for 50 to 100 bags. For the other three lines they make reductions of 6d., 1s. and 1s. 6d. per bag respectively on orders for 10 to 25, 30 to 50, and 50 to 100 bags. Analysis guaranteed as per list.

The Produce Market.

CAPE TOWN.

Messrs. Wm. Spilhaus and Co. report under Saturday's date, July 5, as follows:—

Ostrich Feathers.—On Thursday's sale only a small quantity was offered, and the quality was far below the general average. Competition was weak throughout the sale, and prices ruled irregular. Business for the day, 234 lb. 9 oz, which sold for £373 15s.

					£ s. d.	£ s. d.
Whites (primes) ..	..	..	..	..	10 10 0	14 0 0
Firsts ..	..	..	..	..	7 10 0	10 0 0
Seconds ..	..	..	..	..	5 10 0	6 10 0
Thirds ..	..	..	..	..	4 0 0	4 10 0
Inferior and stalky ..	..	..	..	..	1 15 0	2 5 0
Byocks ..	..	..	..	..	4 10 0	6 0 0
Feminas (super) ..	..	..	..	..	6 0 0	8 0 0
Firsts ..	..	..	..	..	4 10 0	5 10 0
Seconds ..	..	..	..	..	3 0 0	4 0 0
Thirds ..	..	..	..	..	2 0 0	2 10 0
Inferior ..	..	..	..	..	0 15 0	1 0 0
Dark ..	..	..	..	..	3 10 0	5 0 0
Spadonas (White) ..	..	..	..	..	1 10 0	2 0 0
Light and Dark ..	..	..	..	..	0 10 0	1 0 0
Boos (White) ..	..	..	..	..	1 0 0	1 5 0
Light ..	..	..	..	..	0 17 6	1 2 6
Black Butts ..	..	..	..	..	0 7 6	0 10 0
Dark ..	..	..	..	..	0 7 6	0 10 0
Inferior ..	..	..	..	..	0 8 0	0 5 0
Blacks (Long) ..	..	..	..	..	4 0 0	4 10 0
Long Medium ..	..	..	..	..	2 0 0	3 0 0
Medium ..	..	..	..	..	1 0 0	1 10 0
Short ..	..	..	..	..	0 5 0	0 10 0
Long Floss ..	..	..	..	..	1 5 0	1 10 0
Medium Floss ..	..	..	..	..	0 7 6	0 10 0
Short Floss ..	..	..	..	..	0 2 6	0 5 0
Drabs (Long) ..	..	..	..	..	2 0 0	3 0 0
Long Medium ..	..	..	..	..	1 5 0	1 10 0
Medium ..	..	..	..	..	0 10 0	1 0 0
Short ..	..	..	..	..	0 2 0	0 4 0
Long Floss ..	..	..	..	..	1 5 0	1 10 0
Medium ..	..	..	..	..	0 5 0	0 10 0
Short ..	..	..	..	..	0 2 0	0 3 0
Inferior Long Blacks and Drabs ..	..	..	..	..	0 15 0	1 0 0
Floss ..	..	..	..	..	0 4 0	0 5 0
Wiry ..	..	..	..	..	0 0 6	0 0 6
Chicks ..	..	..	..	..	0 0 6	0 1 0

Wools.—Since our last a sale was held on Tuesday, when 160 bales were sold; another on Friday, in which 380 bales were offered. Competition, particularly yesterday, was somewhat restricted, as some of the buyers are preferring to await news from the London sales, which open on Tuesday, the 8th inst. Prices for good combing Karroo wools were unchanged, and some well-sorted clips fetched from 6½d. to 6½d. per lb. Heavier lots from 5½d. to 5½d. per lb. Scouring wools were somewhat weaker, and for

these bids were obtained of from 4½d. to 4¾d. per lb. West Coast grease wools, rather heavy, sold at 4½d. to 4¾d. per lb. on Tuesday. Scoured wools yesterday were slightly easier, and a superior lot of snow-whites fetched 1s. 5½d. per lb.; seconds, 1s. 2½d.; whereas on Tuesday 1s. 6d. was paid for a wool that was rather burry. We quote: Karroo grease for scouring, 3¾d. to 5d. per lb.; Karroo grease for combing, 5½d. to 6½d. per lb.; snow-whites, 1s. 1½d. to 1s. 2½d. per lb.; super snow-whites, 1s. 2d. to 1s. 4½d. per lb.; extra super snow-whites, 1s. 5d. to 1s. 6d. per lb.

Skins.—We are informed by cable that at the sale in London goatskins showed a further decline, and we are now obliged to quote ¾d. lower. We quote: Merino long wools, 5d. to 5½d. per lb.; short wools, 4½d. to 4¾d. per lb.; damaged and pelts, 3½d. per lb.; bastards, 3½d.; Capes, sound, 1s. 9d. each; cut, 1s.; damaged, 6d.; goatskins, 10d. per lb.; sundried, 6d. per lb.; scurvy, 6d. each; other descriptions according to quality.

Thursday, July 10th, 1902.

Ostrich Feathers.—Stocks on hand are heavy. Owing to sellers' limits being too high for their goods there will be no market held this week. Now that short, dark goods are so low in price we should advise that these should not be plucked, as in many instances we cannot obtain the cost of sorting.

Wool.—By cable we learn that the London wool sales opened firm on Tuesday, and fine wool is reported to be rather higher in price than at the close of last series. Since our last no sales have taken place here and we cannot report any change in the market.

Skins —No change.

GOVERNMENT NOTICES.

Cape Government Railways.

ADMISSION OF APPRENTICES INTO THE LOCOMOTIVE DEPARTMENT.

There are vacancies for Apprentices in the following Branches of the Locomotive Workshops at Salt River, viz. :-

Boiler Shop	..	Three boys for heating rivets and cleaning Boilers, to learn the trade of a Boilermaker.
Carriage Shop	..	Two boys, to learn the trade of a Sawyer.
Carriage Shop	..	One boy, to learn the trade of a Carriage Fitter.
Carriage Shop	..	Two boys, to learn the trade of a Coach Builder.
Carriage Shop	..	Two boys, to learn the trade of a Coach Painter.
Blacksmith Shop	..	One boy, to work steam hammer ;

and applications from youths between the ages of 14 and 16 are invited for filling the vacancies.

Applicants must have passed the 5th Standard, and will be required to produce a certificate to that effect, and also certificates as to character.

Applicants who are able to produce proofs of having satisfactorily passed a higher standard of education will receive the preference in filling the vacancies, other things being equal.

The rate of pay to commence with will be 2d. per hour.

Applications should be sent to the Chief Locomotive Superintendent or Locomotive Superintendent, Salt River, from whom any further particulars can be obtained.

Office of the General Manager of Railways, Cape Town, T. R. PRICE,
8th March, 1902. General Manager.

Farmers' Apprentices. Dairy Assistants, &c.

As inquiries are from time to time received from young men from abroad as to where they may serve apprenticeship or gain practical experience of farming in this Colony, before starting on their own account, the Secretary for Agriculture invites Farmers who are willing to receive young men of good character, for this purpose, to register their names with the Under Secretary for Agriculture, stating the class of farming they do, how many young men they are prepared to take, and for what period they would enter into an agreement.

It is not probable that these young men will be in a position to give more than their free services in return for the experience they will gain ; that is, they will not be able to pay any fee ; and they will look to receiving free board and lodging in return for their services.

It is to Farmers, therefore, who are willing to grant such young men free board and lodging in return for services rendered, that this application is especially addressed.

With reference to the above notice to Farmers, the Secretary for Agriculture now invites young men who are willing to engage themselves as Farmers' Apprentices in Cape Colony to register their names with the Under Secretary for Agriculture, Cape Town. The apprentice will gain experience in farming in South Africa, and have an opportunity for spying out the land before starting on his own farm. To the new comer from another country this is essential, for he has much to learn and unlearn.

Many applications for such Apprentices have been received from Farmers in the Colony. It will be noted that the Apprentice will neither receive wages, nor pay a fee. He will get free board and lodging in return for his services, and at the same time acquire the experience he is in need of.

Applications for employment have also been received from several Lady Dairy Experts and Dairy Assistants ; and Dairy Farmers and others desiring to avail themselves of the services of such are invited to register their names with this Department, giving particulars as to situation and extent of operations, etc. and salary and other emoluments they are prepared to offer.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM BASUTOLAND.

By command of His Excellency the Governor the following Proclamation No. 63, 1902, was published in the *Government Gazette* of April 22nd, 1902 :—

Under and by virtue of the powers vested in me by the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," and the Act No. 2 of 1897, entitled the "Animal Diseases Rinderpest Amendment Act, 1897," I do hereby proclaim, declare and make known that, whereas the disease known as Rinderpest is prevalent amongst cattle in Basutoland, it shall not be lawful, from and after the date hereof, to introduce or to cause or allow Horned Cattle to be introduced from Basutoland into any part of this Colony, save and except cattle in yoke and accompanied by a certificate, to be obtained and held by the person in charge of such cattle, signed by a competent and responsible officer, to the effect that such cattle are free from infectious or contagious disease and have not been in contact with infected animals or come from a locality where any such disease shall be known to exist.

And I do hereby proclaim and make known that all Horned Cattle which may enter this Colony in contravention of this Proclamation shall be liable to be destroyed.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM ORANGE RIVER COLONY AND THE TRANSVAAL.

By command of His Excellency the Governor, the following Proclamation No. 139 1901, was published in the *Government Gazette* of August 16th, 1901 :—

Under and by virtue of the powers vested in me by the "Animal Diseases Act," No. 27 of 1893, and by the "Animal Diseases Rinderpest Amendment Act," No. 2 of 1897, I do hereby proclaim, declare and make known that it shall not be lawful, from and after the date hereof, to introduce or to cause or allow Horned Cattle to be introduced into any part of this Colony from the Orange River Colony and the Transvaal, save and except such cattle as may be required to be introduced by the Government for the purpose of supplying Bile or Serum for inoculation against Rinderpest :

And I do hereby proclaim and make known that all Horned Cattle which may enter this Colony in contravention of this Proclamation shall be liable to be destroyed

And I do hereby further declare that this Proclamation shall have effect from and after the date hereof, and shall continue in force until amended or repealed.

Proclamation No. 217, bearing date the 29th day of October, 1900, together with the regulations issued thereunder, is thereby repealed.

And I do strictly charge every Resident Magistrate, Field-cornet and Justice of the Peace to see that this Proclamation is obeyed, and to bring to justice any person who may contravene the same.

Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined Regulation for checking the spread of the infection is republished.

REGULATION ISSUED UNDER PROCLAMATION No. 30, DATED 20TH JANUARY, 1899.

Whenever under the provisions of Sections 11 and 12 of Act No. 27 of 1893, any area is declared or proclaimed to be an area infected with Rinderpest, it shall not be lawful for any person, animal, animal produce, article or thing, who or which may, in the opinion of the Magistrate of the District in which such area is situated, be liable to convey infection of Rinderpest, to leave or to be removed therefrom.

Inoculation Against Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of the Colony, it is desirable to inform stock-owners of the intentions of the Government as to dealing with the outbreak should it unfortunately become general in the Colony, and to advise stock-owners as to the best course to follow.

The Government propose that, as a general rule, cattle-owners themselves should perform the inoculation. Glycerinated Bile will be used, though circumstances may arise where it will be preferable to use Serum.

Bile Stations will be established in suitable places as necessity arises in localities where farmers have agreed to contribute the required proportion, say 5 per cent., of their cattle for production of the bile. It must be clearly understood that unless farmers are prepared to thus contribute the necessary cattle, it will be impossible for them to have the benefit of a Bile Station.

Glycerinated Bile will be issued free to contributors in proportion to the number of cattle contributed to a Bile Station. To non-contributors a fair charge will be made for bile if any be available for issue.

Serum will be charged for at the rate of £1 per bottle of ten doses.

A limited supply of Glycerinated Bile to meet emergencies will, for a time, be available, free of charge, from the Bile Station which has been established under arrangements with the Imperial Military authorities near Aliwal North.

As occasion requires, Demonstrators will be sent to instruct farmers in the method of inoculation, free of charge. They will, as a rule, inoculate only enough cattle to show how it is to be done, leaving the owner to continue the work. The Government will supply syringes on application to the Resident Magistrate, or to the Demonstrators at the following charges:—20 cc. capacity, 20s; 10 cc. capacity, 15s. This payment may be recovered on return of the syringe to the Magistrate, in good order.

After the experience gained during the outbreak of 1896-1898, the Colonial Veterinary Surgeon wrote* as follows:—

"The method of inoculation which I would recommend in future sporadic outbreaks of the disease is briefly as follows:—

"*Infected Herds.*—These should be inoculated at once with either serum or glycerinated bile; every animal which indicates infection by a rise of temperature should receive a large dose of not less than 100 cc. of serum, or 80 cc. of glycerinated bile; the latter should, by preference, be injected into the jugular vein, so as to secure its immediate action. Then from eight to twelve days after, all the animals in the herd which give no indication of being infected with the disease, or fever temperature should receive an injection of pure bile; not less than 10 cc., and for large animals 20 cc. This will confer a lasting immunity sufficient for all practical purposes.

"*Clean Herds.*—When it is decided to inoculate a clean herd, which is in danger of becoming infected through its proximity to diseased cattle I would recommend that the animals composing the herd should be inoculated first with 20 cc. of glycerinated bile, and to follow this inoculation in from eight to twelve days with an injection of from 10 to 20 cc. of pure bile. This will confer a strong and lasting immunity on the animals in the herd, and will be free from risk arising from the inoculation or of introducing the disease.

"*Use of Pure Bile.*—Pure fresh bile should not be used in an infected herd, if any of the other inoculating materials can be obtained, as it tends to intensify the character of the disease in those already infected, and its immunising effect is too slowly developed to protect the healthy cattle against infection, if they are left in contact with those already sick. If no other means are available, however, the temperatures of the whole of the cattle in the infected herd should be carefully taken by the clinical thermometer, and only those which register a normal temperature should be inoculated with pure bile, the others should be separated from the inoculated lot at once, and carefully tended. If glycerine can be obtained, the spare bile should be mixed with it in the proper proportions—one part of glycerine to two parts of bile. This mixture, after standing forty-eight hours, may be injected into the affected animals in large doses, not only with safety, but with marked benefit.

"*Preparing the Bile.*—The bile should be taken from an affected animal immediately after death, or from one which is killed in the last stage of collapse.

* See *Agricultural Journal*, June 8, 1899, in which will be found a full consideration of the different methods of inoculation.

"Biles of all shades of colour—except those which are red from the presence of blood—may be used, so long as they are clear and free from a putrid smell. Thin light yellow biles should also be rejected.

"All the galls extracted at one time should be mixed together, after standing separately for twelve to eighteen hours, so as to render them uniform in strength and immunising properties. Pure bile should be used on the second day after being drawn, unless it is kept in an ice chest, when it may be kept sweet much longer. But if pure bile is used as a second inoculation only, as above directed, it is not desirable to keep it longer than twenty-four hours.

"Glycerinated bile is made by adding one part of glycerine to two parts of bile, stir the mixture well, then mix all the biles taken at one time, and allow them to stand for eight days. But if there is urgency, the glycerinated bile may be used forty-eight hours after it is mixed.

"I would strongly recommend that in every outbreak of the disease that occurs, every drop of suitable bile, obtained from the animals which die, should be mixed with glycerine in proper proportions, two parts of the bile to one of glycerine, so that it may be preserved and made available for the inoculation of infected herds, and also for the first inoculation of clean herds which may be considered in danger. Pure bile for the second inoculation of clean herds can always be obtained when the disease appears in any locality, which would be the only reason for inoculating clean herds in the immediate vicinity."

Taking the Bile.—To remove the bile the animal must be laid on its left side, the skin and flesh on the right side immediately behind the last rib being cut through; the ribs being raised, the gall bladder will become visible. The gall bladder should be then punctured with a small knife and the gall allowed to escape into a wide-mouthed bottle. If wide-mouthed bottles are not available then ordinary whisky bottles may be used with an *enamelled* funnel, which can be procured at any country store. Every precaution must be taken that the operation is performed in a thoroughly clean manner, the hands of the operator and all knives, &c., being thoroughly cleansed before use.

Inoculating.—After having secured the animal to be operated upon, the necessary dose of bile is injected under the skin of the dewlap by means of a Hypodermic Syringe, care being taken that the point of the needle is not inserted into the flesh, but between the skin and flesh.

Symptoms of Rinderpest.

The Outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined description of the symptoms of Rinderpest is hereby published:—

The early symptoms of Rinderpest are a rise of internal temperature to 106 or 107° Fahr.; the animal stands with its head hanging down, ears drawn back and coat staring; it refuses all food and occasionally shivers. A mucous discharge flows from the eyes and nostrils; the extremities are cold, and the breathing is laboured and frequently accompanied with moaning. The inner part of the upper lip and roof of the mouth and all visible mucous membranes are reddened, and covered with an eruption of minute pimples, and later with a branlike exudation. The bowels are occasionally constipated, but in most cases diarrhoea sets in, the evacuations being slimy and very frequently of a dirty yellow colour. The prostration of strength is great, the animal staggering when made to move. In milch cows the secretion of milk is rapidly diminished, and soon ceases altogether. The disease usually ends fatally in from six to ten days.

It is generally believed that the infection is produced through the respiratory organs; from there the contagion becomes generalised. The contagion exists in the secretions and excretions, urine, saliva, mucous secretions of the nose, mouth and eyes in the sweat, expired air, blood, and in all the tissues. It may be conveyed directly by the diseased animals, or indirectly by the dung, the bedding, the earth, hides, wool, meat, clothing, wagons or vessels, by people, dogs, sheep and chickens, &c. Contagion takes place only through short distances. When the weather is dry this is reduced to its minimum (about 27 yards), and the progress of the disease may be stopped by a ditch separating the diseased from the healthy animals.

In order to detect the earliest symptoms of Rinderpest, owners of horned cattle are warned of the urgent necessity for keeping a constant and close watch upon their stock. Any suspicious cases should be immediately reported to the nearest Resident Magistrate,

Field-cornet or Police Officer, and the sick animal kept separate till an inspection is made. Stock should be carefully examined daily by a responsible person, more particularly for any symptoms resembling those above described.

Locust Disease Fungus.

The attention of landowners and others is drawn to the provisions of Government Notice No. 1128 of 1897, wherein it is notified for general information that supplies of Locust Disease Fungus may be obtained from the Director of the Bacteriological Institute, Graham's Town, at a cost of sixpence per tube to all applicants residing in the Colony. Applicants beyond the borders of the Colony are required to pay the cost of postage in addition to the amount charged.

As the Fungus is cultivated on a moist jelly and is therefore liable to become dried up and useless if kept long on hand, it is not found possible to store supplies in the various districts of the Colony; and applicants desirous of trying the Fungus should therefore submit their applications, with a remittance for the quantity applied for, *direct* to the Director, who can always supply the Fungus in proper condition and on short notice.

Lung-Sickness.

INTRODUCTION OF CATTLE FROM OVER THE ORANGE RIVER.

By command of His Excellency the Governor, the following Proclamation was published in the *Government Gazette* of the 30th October, 1900:—

Whereas by virtue of the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," it is enacted that it shall be lawful for the Governor by Proclamation in the *Gazette*, to prohibit the importation or introduction into this Colony from any place beyond the same in which any infectious or contagious disease affecting animals shall be known or be supposed to be prevalent, of any such animals as in such Proclamation shall be mentioned

And whereas the disease known as Lung-sickness (Pleuro-pneumonia) is prevalent amongst cattle in the Transvaal and the Orange River Colony:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of Cattle from the Transvaal and the Orange River Colony, save by road by way of Aliwal North, Bethulie Bridge or Norval's Pont, and subject to the regulations set forth in the Schedule hereto, shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Schedule to the foregoing Proclamation.

(1) No cattle shall be introduced into this Colony from the Transvaal or the Orange River Colony by railway.

(2) No cattle shall be introduced into this Colony from the Transvaal and the Orange River Colony by road,

(a) Unless the person in charge of such cattle shall have obtained and have in his possession a certificate with regard to such cattle, in the form set forth in Schedule A hereto, signed by a competent and responsible officer or person delegated for this purpose by the Government of the Transvaal or the Orange River Colony, and

(b) Unless such certificate shall have been countersigned or endorsed by the Inspector appointed for this purpose by the Colonial Government at Aliwal North, Bethulie Bridge, or Norval's Pont.

(3) No person intending to introduce cattle from the Transvaal or the Orange River Colony, shall be permitted to introduce such cattle unless he shall have obtained the aforesaid endorsement, and he shall, with that view, give timely notice to the Inspector, stating the number of cattle and the place, within 8 miles of Aliwal North, Bethulie Bridge and Norval's Pont, where the cattle may be inspected, and the proposed time of introduction; and upon receipt of such notice the Inspector shall proceed at the time and to the place specified in such notice, or as soon thereafter as may be possible, ~~then~~ and there to examine such cattle.

(4) The person in charge of such cattle shall be bound to produce the certificate aforesaid to the Inspector, and such Inspector shall, if the certificate be in order, and the cattle be free from disease, make an endorsement on the certificate in the form given in Schedule "B" hereto, and the cattle may thereafter proceed on their way. The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, duly endorsed, to any Field-Cornet, Police Officer or owner of land over which the cattle may pass or be passing.

(5) In the absence of the Certificate prescribed in regulation (2) the cattle shall be quarantined for a period not less than twenty-one days at some place on the north bank of the Orange River and in the neighbourhood of Aliwal North, Bethulie Bridge and Norval's Pont where they may be inspected by an Officer of the Colonial Government appointed for the purpose, at such intervals as may be considered necessary.

(6) On the expiration of the period of quarantine the Inspector, should he be satisfied that the cattle are free from disease, shall issue a Certificate in the form set forth in Schedule C hereto.

(7) The person in charge of such cattle as are referred to in the Certificate mentioned in regulation (6) is liable to be called upon to produce such Certificate to any Field-Cornet, Police Officer or owner of land over which such cattle may pass or be passing.

(8) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for any period not exceeding three months unless such fine be sooner paid.

SCHEDULE A.

I hereby certify that the undermentioned Cattle either have not mixed with and Cattle affected with Lung sickness and are free from disease; or have been effectively inoculated against Lung-sickness and are free from disease, viz :—

Number and general description of Cattle	.....
Owner's name and address	.....
In charge of.....	.....
Place to which Cattle are being sent.....	.....
	(Signature).....
	(Address).....
Date.....	.....

SCHEDULE B.

(Endorsement to be made by the Inspector.)

I hereby certify that I have examined the Cattle to which this Certificate refers and find them to be free from disease.

	(Inspector's Signature).....
	(Address).....
Date.....	.....

SCHEDULE C.

I hereby certify that the Cattle to which this Certificate refers have undergone a period of quarantine for at least twenty-one days, that I have examined them and find them to be free from disease, viz. :—

Number and general description of Cattle	.....
Owner's name and address	.....
In charge of.....	.....
Place to which Cattle are being sent.....	.....
	(Inspector's signature).....
	(Address).....
Date.....	.....

Rewards for Destruction of Vermin.

By command of His Excellency the Governor, the following Government Notice was published in the *Government Gazette* of the 16th November, 1900:—

DESTRUCTION OF WILD CARNIVORA.

1. The animals for which rewards will be paid and the rates of payment will be as follows:—

		s.	d.
For a Lynx or Red Cat (<i>Felis caracal</i>)	3 6
For a Red Jackal (<i>Canis mesomelas</i>)	5 0
For a Silver or Side-striped Jackal (<i>Canis adustus</i>)	5 0
For a Maanhaar Jackal (<i>Proteles cristatus</i>)	3 0
For the young or pups of the above Jackals, under three months old, for which whole skins, including tail and scalp, must be produced	1 0
For a Baboon (<i>Papio porcarius</i>)	1 3

2. Payment will be made on the first and third Monday in each month, at the Office of the Resident Magistrate or Assistant Resident Magistrate of the District within which the animals have been destroyed.

3. Applicants for rewards under these regulations must, when applying for the payment, produce

- (a) For full-grown animals the complete tail and scalp including the ears. For the young of Jackals, whether Red, Silver or Maanhaar, the whole skin including tail and scalp.
- (b) A Declaration signed by a Landowner, Justice of the Peace or Field-cornet residing in the District, stating that the animals (specifying the number of each kind) for which the rewards are claimed have been destroyed within the boundaries of the District.

Netting for Fruit Trees.

The Board of Horticulture, Western Province, has decided to again import, in time for next fruit season, a supply of Bird and Fly Netting. The Bird Netting will, like last year, be made to order in pieces of about 130 feet long and 13 feet wide, and its cost will be about 15s. per piece. The Fly Netting will be mosquito netting of the same kind as has been imported on previous occasions. The cost will probably be the same as before, from 7s. to 8s. per piece 120 feet long by 70 inches wide.

Applications should be addressed to the Secretary, Board of Horticulture, Stellenbosch. All applications must be in the hands of the Secretary not later than the 31st July. On arrival of the nettings, applicants will be notified of the amounts respectively due, and on receipt of remittance the nettings will be forwarded.

C. MAYER, Secretary.

Western Province Board of Horticulture,
Stellenbosch, 9th June, 1902.

Salt Bush Seed.

The Department of Agriculture has now received a limited quantity of Salt Bush Seed, which will be disposed of at the rate of 4d. per lb. exclusive of railage. Applications should be addressed to the Under Secretary for Agriculture.

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IV. SOUTH COAST—continued. INCHES.

Blaauwkrantz ..	n.r.
Storm's River ..	n.r.
Witte Els Bosch ..	1-23
Humansdorp ..	1 11
Cape St. Francis ..	0 64
Hankey ..	0-33
Witteklip ..	0-40
Van Staaden's (upper) ..	0-58
Do. (lower) ..	0-42
Uitenhage ..	0-51
Do. (Inggs) ..	0-46
Do. (Park) ..	0-38
Dunbrody ..	0 24
Port Elizabeth (Harbour) ..	0-53
Do. (Victoria Park) ..	0-76
Walmer Heights (near Port Elizabeth) ..	1-28
Tankatara ..	0-30
Lottering ..	n.r.
Shark's River (Nursery) ..	0-65
Do (Convict Station) ..	0-47
Grootvader's Bosch ..	n.r.
Karnmelks River ..	n.r.
Armadales ..	0-32
Vogel Vlei ..	1 75
Great Brak River ..	1 71
Melkhoutfontein ..	1 38
Centlivres ..	0 31
Kruis River (Uitenhage) ..	0-54

V. SOUTHERN KARROO:

Touws River (D. E.'s Office) ..	1-13
Ladismith ..	0-00
Amalienstein ..	0-38
Calitzdorp ..	0-00
Oudtshoorn ..	0-05
Vlakte Plaats ..	n.r.
Uniondale ..	0-22
Kleinpoort ..	n.r.
Glencannon ..	0 00
Triangle ..	1-61
Grootfontein ..	0-10
Pietermeintjes ..	1-25
Bok River ..	1-78
Verkeerde Vlei ..	1-09
Seven Weeks Poort ..	0-45

VI. WEST CENTRAL KARROO:

Matjesfontein ..	0-77
Prince Albert Road ..	0-00
Fraserburg Road ..	n.r.
Prince Albert ..	0-06
Zwartberg Pass ..	0-15
Beaufort West ..	0-00
Dunedin ..	n.r.
Nel's Poort ..	0-10
Camfer's Kraal ..	0-26
Lower Nel's Poort ..	n.r.
Baaken's Rug ..	0-21
Willowmore ..	0-16
Steytlerville ..	0-00
Rooiplaats ..	n.r.
Laingsberg ..	0 19

VII. EAST CENTRAL KARROO: INCHES

Aberdeen (Gaal) ..	0 00
Do. (Bedford) ..	n.r.
Aberdeen Road ..	n.r.
Rietfontein ..	0-30
Winterhoek ..	n.r.
Klipdrift (De Erf) ..	n.r.
Kendrew ..	0-00
Graaff-Reinet ..	0-00
Do. (College) ..	0-04
New Bethesda ..	0-00
Rooie Bloem ..	0-00
Wellwood ..	n.r.
Do. Mountain ..	n.r.
Jansenville ..	0-02
Patryfontein ..	n.r.
Toegedacht ..	n.r.
Klipfontein ..	0-00
Cranmure ..	n.r.
Pearston ..	0-00
Frederberg (Walsingham) ..	0-00
Somerset East ..	0-00
Do. (College) ..	0-08
Louphope ..	n.r.
Middleton ..	n.r.
Cornvale (Div. Aberdeen) ..	n.r.
Cookhouse ..	n.r.
Doornbosch, Zwagershoek ..	n.r.
Middelwater ..	0 00
Darlington ..	n.r.
Bloembhof ..	0 00
Arundale ..	0-00

VIII. NORTHERN KARROO:

Calvinia ..	n.r.
Middlepost ..	n.r.
Sutherland ..	1-16
Rhebokfontein ..	n.r.
Fraserburg ..	n.r.
Onderste Doorns ..	n.r.
Droogfontein ..	n.r.
Gannapan ..	n.r.
Carnarvon ..	0-15
Wagenaar's Kraal ..	0-11
Brakfontein ..	n.r.
Vogelstruisfontein ..	n.r.
Victoria West ..	0-15
Britstown ..	0-00
Murraysburg ..	n.r.
De Kruis ..	0-20
Richmond ..	n.r.
De Aar ..	0-00
Middlemount ..	n.r.
Hanover ..	0-04
Phillip's Town ..	0-13
Boschfontein ..	0-21
Petrusville ..	0-00
The Willows ..	n.r.
Naauwpoort ..	0-06
Middelburg ..	0-00
Colesberg ..	0-24
Tafelberg Hall ..	0-00
Rietbult (Colesberg Bridge) ..	0-09
Stonehills ..	0-00
Cadock ..	0-01

VIII. N. KARROO—*continued.*

	INCHES
Cradock (Rose) ..	0·01
Varsch Vlei ..	n.r.
Witmoss ..	0 00
Steynsburg ..	0·08
Do. (Nesemann) ..	0·07
Daggaboer's Nek ..	0 05
Springfield ..	n.r.
Quagga's Kerk ..	n.r.
Tarkastad ..	0·06
Drummond Park ..	0 00
Riet Vlei ..	0 00
Brand Vlei ..	n.r.
Williston ..	n.r.
Omdraai's Vlei ..	n.r.
Zwagersfontein ..	0·00
Varken's Kop ..	n.r.
Culmstock ..	0 00
Doorskuilen ..	n.r.
Houwater Dam ..	n.r.
Hillmoor ..	0·11
Glen Roy ..	n.r.
Fish River ..	n.r.
Spitzkop ..	n.r.
Phizantefontein ..	n.r.
Blesjesdam ..	n.r.
Groot Vley, Theebus ..	n.r.
Kleinhaasfontein ..	0·06
Scorpions Drift ..	0 00
Beyersfontein ..	0·18
Wagenaar's Kraal ..	0·11

IX. NORTHERN BORDER:

Pella ..	n.r.
Kenhardt ..	n.r.
Van Wyk's Vlei ..	n.r.
Prieska ..	n.r.
Dunmurry ..	n.r.
Griqua Town ..	0 05
Campbell ..	0 04
Douglas ..	0 00
Avoca (Herbert) ..	0·00
Eskdale ..	0 00
Hopetown ..	n.r.
Orange River ..	n.r.
Newlands (Div. Barkly West) ..	0·00
Groot Boetsap ..	n.r.
Kimberley (Gaol) ..	0 13
Do. (Stephens) ..	0·20
Beaconsfield ..	n.r.
Bellsbank (Div. Barkly West) ..	n.r.
Grootdrink ..	n.r.
Barkly West ..	0·08
Upington ..	n.r.
Trooilsapspan ..	n.r.

X. SOUTH-EAST:

Varken's Kuil (Div. Bedford) ..	n.r.
Fairholt ..	n.r.
Cheviot Fells (Bedford) ..	n.r.
Alloedale ..	n.r.
Bedford (Gaol) ..	0·00
Do. (Hall) ..	n.r.
Sydney's Hope ..	0·44

X. SOUTH EAST—*continued.*

	INCHES.
Cullendaie ..	n.r.
Adelaide ..	0·00
Atherstone ..	0·57
Alexandria ..	0 75
Salem ..	0·83
Graham's Town (Gaol) ..	1·51
Do. (Bact.Inst.) ..	0·43
Heatherton Towers (near Graham's Town) ..	n.r.
Fort Beaufort ..	0 07
Katberg ..	0·05
Do. (Sanatorium) ..	0·02
Balfour ..	0·00
Seymour ..	0·15
Glencairn ..	n.r.
Alice ..	0·10
Lovedale ..	n.r.
Port Alfred ..	0·66
Hogsback ..	0 94
Thaba N'doda ..	0·82
Peddie ..	0·29
Cathcart ..	0·02
Keiskama Hoek ..	0·00
Dynamite (Crawley) ..	0·00
Thomas River ..	0·00
King William's Town ..	0·49
Do. Hospital ..	0·88
Stutterheim (Wylde) ..	n.r.
Do. (Besté) ..	0·29
Dohne ..	0·00
Kabusie ..	2·86
Blaney ..	n.r.
Kei Road ..	0·79
Evelyn Valley ..	1 84
Berlin ..	0·70
Isidenge ..	0·82
Pirie Forest ..	0·95
Quacu Forest ..	0·45
Kologha ..	0·74
Fort Jackson ..	0·69
Komgha ..	0·49
Prospect Farm (Div. Komgha) ..	0·64
Hopewell Do. ..	n.r.
East London, West ..	1·25
Do. East ..	1·26
Fountain Head ..	n.r.
Fort Cunynghame ..	0 66
Cuylerville ..	n.r.
Belo ..	0·13
Fort Fordyce ..	0·25
Melrose ..	0 00
Scott's Bottom ..	0·68
Sunnyside ..	0·87
Forestbourne ..	1·31
Wolfridge ..	0·18
Cata ..	0·27
Dontsah ..	0·15
Mount Coke ..	0·65

XI. NORTH-EAST:

Venterstad ..	0·07
Ellesmere ..	0 11
Burnley, Cypherget ..	n.r.
Burghersdorp ..	0 05
Do. (Le Roex) ..	n.r.

XI. NORTH-EAST—continued.		INCHES.	XII. KAFFRARIA—continued.		INCHES.
Molteno Station ..	..	n.r.	Elliotdale ..	..	0.00
Cyphergat ..	..	0.21	Mqanduli ..	..	n.r.
Thibet Park ..	..	0.00	Matatiele ..	..	n.r.
Sterkstroom ..	..	n.r.	Umtata ..	..	0.34
Do. (Giddy) ..	..	n.r.	Qumbu ..	..	n.r.
Rocklands ..	..	0.07	Kokstad ..	..	0.09
Aliwal North (Gaol) ..	..	0.23	Port St. John's ..	..	2.96
Do. (Brown) ..	..	0.27	Umzimkulu ..	..	n.r.
Rietfontein ..	..	0.21	Woodcliff ..	..	n.r.
Buffelsfontein ..	..	n.r.	Tabankulu ..	..	0.19
Hex's Plantation ..	..	0.00	Kilrush ..	..	0.04
Carnarvon Farm ..	..	0.20	Somerville (Div. Tsolo) ..	..	0.17
Jamestown ..	..	0.25	Tsomo ..	..	0.00
Queenstown (Gaol) ..	..	0.00	Seteba ..	..	n.r.
Do. (Beswick) ..	..	n.r.	Flagstaff ..	..	0.56
Dordrecht ..	..	n.r.	Quebe ..	..	1.15
Tylden ..	..	0.00	Insikeni ..	..	0.03
Snow Hill ..	..	n.r.	Bazeya ..	..	0.92
Herschel ..	..	0.04			
Lady Grey ..	..	n.r.			
Bolotwa (Contest) ..	..	n.r.	XIII. BASUTOLAND :		
Lady Frere ..	..	0.04	Mafeteng ..	..	0.19
Avoca (Div. Barkly East) ..	..	n.r.	Mohalie's Hoek ..	..	n.r.
Keilands ..	..	0.00	Qacha's Nek ..	..	n.r.
Barkly East ..	..	0.26	Moyeni Quthing ..	..	0.71
Glenlyon ..	..	0.38	Teyateyaneng ..	..	0.13
Gateshead ..	..	n.r.	Leribe ..	..	n.r.
Lyndene ..	..	0.10	Butha Buthe ..	..	n.r.
Moofontein ..	..	0.00	Maseru ..	..	n.r.
Poplar Grove ..	..	0.00			
Biesjesfontein ..	..	n.r.	XIV. ORANGE RIVER COLONY:		
Whittlesea ..	..	0.00	Bethulia ..	..	0.12
Halseston ..	..	0.42	Kroonstad ..	..	n.r.
Doornkop ..	..	0.09			
Blikana ..	..	0.74	XV. NATAL :		
Table Hill ..	..	0.38	Durban, Observatory ..	..	1.21
Middlecourt ..	..	0.00			
XII. KAFFRARIA :			XVI. TRANSVAAL :		
Slaate, Xalanga ..	..	n.r.	Johannesburg ..	..	n.r.
Ida, Xalanga ..	..	n.r.	Do. Cemetery ..	..	n.r.
Cala, Xa'anga ..	..	n.r.			
Cofimvaba ..	..	n.r.	XVII. BECHUANALAND :		
Nqamakwe ..	..	0.30	Vryburg ..	..	0.07
Main ..	..	n.r.	Taungs ..	..	0.00
Engcobo ..	..	n.r.			
Butterworth ..	..	n.r.	XVIII. RHODESIA :		
Kentani ..	..	0.38	Salisbury ..	..	n.r.
Maclear	n.r.	Hope Fountain	0.01
Idutywa	0.30	Geelong	n.r.
Willowvale	0.88			
Mount Fletcher	0.09			

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EDITORIAL NOTES.

With this issue of the *Agricultural Journal* the new order of things commences. Owing to the change it was not found convenient to publish any earlier this month, but in future the *Journal* will be placed in the hands of subscribers within the first week of every month, provided the postal arrangements allow of delivery within that period. As it will be necessary to keep a close check upon the distributing arrangements in order to attain this object, all readers and subscribers are earnestly requested to notify

to the Editor at once any delay in its receipt. By doing so they will facilitate distribution and add to the usefulness and value of the publication by assuring its delivery to all concerned within a proper and reasonable period after publication.

The aim of the *Journal* in the future will be to provide the farmers of the country and all interested or concerned in the rural industries of South Africa with information as seasonable and up-to-date as it can be obtained. In doing this, it must not be supposed for a moment that the exceedingly valuable technical information published from time to time in the *Journal* is to be sacrificed or set aside. It is hoped, so soon as the new arrangements are all completed, to give full scope to all, and with this end in view we would appeal once more to our readers to favour us with their experiences and the results attained by the practical work in their several occupations.

One of the new features of the *Journal* is introduced in this issue. Under the heading of "Farm and Veld" will be found some seasonable notes which, it is hoped, may prove of benefit to some of the many who are toiling on the land. A great deal of the information there set forth may be perfectly familiar to a large number of our regular readers, but even the best informed among us need to have our memories jogged occasionally or we are apt to reach that unhappy condition of having forgotten more about our subject than our successful competitor ever learned. In other words, we rust. Therefore at the risk even of charges of repetition the pages devoted to "Farm and Veld" will continue month by month to deal with all the phases of the agricultural and pastoral industries of South Africa as they arise and are affected by the varying climatic and other conditions.

Some of the more experienced among the readers of the *Journal* might help towards increasing the usefulness of the publication by contributions for these pages, always remembering that their notes should be seasonable, and if possible deal with the month in which they will appear, either by comparison with other seasons or anticipations based on carefully drawn deductions. The South African farmer needs to be guided by South African experiences, and the only men who can supply his needs in this direction are those who share his struggles with the forces of nature, and participate with him in her bounteous provisions. When nature is kind in South Africa she is kindness unequalled. But unfortunately she is not always in a kindly mood and it is then that we need to propitiate her. That is when the need arises for a comparison of experiences, a round table conference as it were, at which the collective wisdom of the land—technical and practical—can sit and discuss the best means of ameliorating the conditions of all. If the farmers of the

Colony would look upon the *Journal* in this light they would help towards helping themselves and add to the amenities and profits of rural life in this great sub-continent.

The vagaries of the weather are touched upon in a casual note under the heading of "Farm and Veld," and the need is urged for a systematic study of the meteorological conditions of the whole of the eastern littoral and the air circulation of the Indian Ocean. It is to be feared we are some distance off anything of the kind, but that is no reason why intelligent observations of local conditions should not be heeded. The present season has been abnormal so far and its vagaries have been experienced all over South Africa. As it is not too much to suppose that these abnormal conditions must influence the whole of the coming season, we would like to accentuate the warning given under the heading of "Farm and Veld" and ask the stock farmers of the Eastern Province and the upper Karoo to be prepared. A series of strong cold south-east winds accompanied perhaps by heavy rains would play havoc in the Eastern Province in the spring unless the stock-owners are prepared. What with disease and drought, locusts and war, the losses in stock have been something enormous all through South Africa during the past years. To this has to be added the heavy losses by the recent snow-storm. Any further loss which can be avoided by a little forethought and care will mean an important saving to the country. And every horn and every hoof saved from destruction in existing conditions is of great value, as acclimatised stock are getting very scarce.

Particular attention is called to what may be described as an interim report by Mr. C. P. Lounsbury, the Government Entomologist, on a series of most interesting experiments conducted by him on the question of the susceptibility of calves to the disease known as heartwater. This report appears in another part of the current issue, and as it is but the advance-courier of a fuller and more comprehensive record our readers will look for the latter with the keenest interest after reading the former. This carefully conducted series of experiments seem to demonstrate beyond a doubt that calves are subject to the disease of heartwater, though the actual course of the disease in those animals is not marked by the same characteristics as are invariably apparent in sheep and goats. The *post-mortem* appearances also show scarcely any of the recognised indications of heartwater, and it is therefore highly probable, as Mr. Lounsbury says, that stock-breeders have hitherto failed to identify the disease in calves even in the worst heartwater districts. As a most interesting and instructive contribution to the rapidly-growing literature on animal diseases in South Africa we confidently commend the careful perusal of this report.

The outbreak of Glanders reported from various parts of the Colony, said to be attributable in a large degree to the distribution

of military horses for sale purposes, has given rise to a good deal of concern and apprehension in many quarters. That it is very serious and regrettable, coming, as it does, at a time when farmers were hoping to secure a full supply of healthy draught animals to carry on their work, is not to be denied. But care and patience, together with prompt attention to the instructions published on another page, should result in minimising the losses if not in stamping out the disease altogether.

Quality or Quantity? This is the long-heard burden of the ancient dispute between grower and merchant. And it is revived again in the little controversy—if we may call it a controversy—between Mr. C. Lee, sen., the well-known breeder of Angora goats, and Mr. S. B. Hollings of Bradford. Mr. Lee's reply to the strictures of Mr. Hollings, which we republish in another part of this journal, should be read very carefully by not only Angora breeders but all who take an intelligent interest in the welfare of the rural industries of the Colony. Mr. Lee accepts the criticism in the sense in which it is offered. And in this lies hope of salvation for that industry. The growth of a spirit of tractability is one of the outcomes of the continuous criticism which has been levelled for years at the methods of the average Cape farmer. The danger of a course of such rigorous treatment was that he might in time have become callous. In the old days there was always a feeling that when advice was offered it would either be scouted or pass unheeded. But persistence is winning, and signs are not wanting that the results of intelligent research and careful experiment are meeting with more appreciation the better informed among the farming community.

In the very important questions raised by Mr. Hollings with reference to the sample clips of mohair submitted to the decision of Bradford experts, we have a most valuable object lesson. Mr. Hollings points out that with all the progress made by the Cape breeders they still put on the market an inferior article. In other words, the Turkey hair of commerce is a more generally acceptable and merchantable article than that sent from the Cape. He gave his reasons fully. To the farmers who depend even in a minor degree on the Angora industry this all means that unless they are prepared to produce an article which ranks with the best they must be content to stand second in the market and see their products passed over directly the demand slackens.

It is all a question of pounds, shillings and pence, and calls for little or no expert advice to supply a remedy. It rests entirely with the farmers themselves whether they will be content to try and meet the demands of the market and produce finer fleeces, or go in the ways which produce the weight at the sacrifice of quality. Mr. Lee touches a vital spot when he points out that fineness can be produced,

but farmers have hitherto preferred the weighty fleece because of the apparent advantage when the clip is sold. This is a short-sighted policy for intelligent men to pursue—and the Angora breeders are among the most intelligent farmers in the Colony, or that industry would not be where it is to-day. The mohair market is a limited, we might say an exclusive, market; and indications are not wanting which show that the enterprising American is looking with envious eyes upon it. These two points alone indicate the necessity that exists for the Cape breeders looking to their own interests. They share at present in what is practically a monopoly between this country and Turkey, and are content to take second place when they might at least be equal. With a third competitor in the field what will become of the Cape clip when the demand is poor? These are "breeding points" that should appeal to the most sceptical, for they touch the pocket of the breeder.

Any readers of the *Journal* who may be interested in Kent or Romney Marsh sheep should note that the Association in future recommends that all sheep of this breed shall be carefully transferred with their breeding and sanitary certificates. In the case of exportations or sales the sheep's Flock Book number is to be carefully transferred with him on the certificate of transfer, which shall also contain a full pedigree of the animal. These and other safeguards are being adopted in order to prevent the substitution of unregistered sheep for registered sheep. These details might give the Angora Goat Breeders' Association a hint or two in their dealings for export.

Mr. Watkins Pitchford, the chief of the Natal Veterinary Surgeons, has been investigating the cattle disease which has been devastating Rhodesia. On his return he reported that the conclusion he had arrived at was that the disease is redwater of so severe a type as to break down the immunity generally possessed by Natal cattle. He considers, however, that Natal has no cause for anxiety as to the disease spreading to that Colony. Dr. Hutcheon, C.V.S., has gone up to Rhodesia by request of the authorities to further investigate. His report, in addition to that of the Natal Veterinarian, will be awaited with the greatest interest.

Griqualand East has always been noted as an excellent stock country, and great hopes were entertained early this year that dairying on a fairly large scale would soon be started in those districts. The heavy losses caused by the recent snow-storm and the severe winter, however, will probably cause a setback. But that a great dairying industry will develop there soon is beyond doubt. When Mr. Owens, the dairy expert, was travelling those districts some months ago the farmers evinced the liveliest interest in his lectures and demonstrations. Butter and cheese making had been engaging

the attention of a good many, and when they realised the advantages to be gained by the co-operative working of creameries they nearly all took to the idea with avidity.

Of course they have their drawbacks there like every other place, but the prospects of the industry are very encouraging. One farmer anticipates a production of about 14,000lbs of cheese for the season. Some of the farmers go so far as to make cheese all the year round, winter and summer. If this sort of thing can be done by individual effort there should be plenty of scope for development under a system of co-operation. The coming season should give some indication as to what may be expected, for several movements in favour of co-operation should be coming to a head shortly.

It would be as well for dairy farmers to sort up their utensils now and again and obtain a little expert advice upon them. Mr. Owens has found it necessary to call attention to the fact that on some farms he has found things in use for cheese making which are quite obsolete. Another point of importance is seeing that proper care and attention is given to the working of cream-separators. Machines are worked when some of the working parts are not receiving oil owing to the small oil-holes being blocked. The result is a very rapid deterioration of the machine and dissatisfaction of the owner, who either condemns the make of the machine or blames his own particular sample, but seldom or never realises that the fault is entirely his own.

To show the possibilities of success contained in the creamery system we may state that one such establishment in the Colony turns out no less than 16 000lbs. weight of butter per month during the summer months. With the assistance of cold storage as much as 20,000lbs. weight has been preserved perfectly fresh at a temperature of 30 degs. for the better markets of the winter months. It is gratifying to feel that this industry is gradually spreading throughout the Colony, and now that a more settled state of affairs may be permanently anticipated there is no reason why dairying should not form one of the staple occupations of the Colonial farmers. There are excellent markets all the year round for dairy produce, only provided it is good and put forward in marketable condition.

The Western Province Agricultural Society is to be congratulated on the favourable report presented to the Annual Meeting on the 26th of last month. As the first leading society to break silence after the war, it is entitled to a certain amount of praise, and although the recent show was robbed of many attractive features by the state of the country, it is eminently satisfactory to learn that in spite of all the drawbacks the attendance as judged by the gate-receipts was

equal in every respect to the best. If this may be taken as a sign of a revival of interest in the agricultural industries of the Colony the gratification is greater still.

At the meeting in question one or two subjects were touched upon which call for wider consideration and discussion than was devoted to them. The one that will most interest members of Agricultural Societies and exhibitors generally is that proposing an extension of one day for the annual Show. There is a great deal to be said in favour of an extra day at the larger Shows of the Colony, for they have grown so extensive of recent years that it becomes a task of some difficulty to master the contents of any of the more important Showyards in the usual time allotted—two days. And here in the Western Province, where fruit and cereals form so important a part of the general agricultural interests, it should not be asking too much for a day to be set aside which could be devoted exclusively to the display of implements specially contrived for these branches of industry. Machinery in motion has an attraction almost amounting to fascination for most people, and if a special day were appointed for an exhibition of this nature the agents for implements and machinery would, we believe, make special efforts to give demonstrations which would be of great practical value to the farming community. There is no reason why the many valuable prizes now allotted for machinery and implements should not be so arranged as to encourage ploughing matches and similar contests between the different makes of machines and implements on the market. The practical result of this would be that the farmer's perplexities would often be simplified by a practical test which would show him at once the implement best adapted to the conditions under which he has to work.

The other question raised through the medium of the annual meeting of the Western Province Agricultural Society is that of agricultural education. There can be few dissentients to the view expressed by Mr. Pearce Ryan, the retiring President, in the memorandum which will be found on another page of this issue of the *Journal*. The great need of the Colony is education—not only agricultural education but elementary and secondary education as well. Every endeavour has been made in the past to bring education to the scattered units who make up the European population of the Colony, and signs are not wanting that those efforts will be maintained in the future. But until primary education is more the common property of the people little good can be obtained by attempting to teach the bulk of the rural population even the elements of agricultural chemistry. What can be done is being done, as is well known by all who take an interest in agriculture in the Colony, and though it would be wrong to say that nothing more could be done in this direction it would be just as wrong to rush to the other extreme

and make provision for a widespread system of education in the higher branches before the needs of the general population have been fully provided for by the Education Department. It should never be forgotten that it is difficult at any time to provide a scattered rural population with educational facilities. But for all that the discussion of the question can do no harm, and if it results in drawing the attention of farmers to the pressure of their own needs in this direction it is to be hoped they will take the earliest opportunity of making up their deficiencies. A knowledge of agricultural chemistry is invaluable, and the coming generation of Colonial farmers will find themselves sadly handicapped without it.

Australia has lost by drought since 1892 upwards of twenty million head of stock, of which 15 millions have been lost since 1899. The present season is the worst ever known in the Island Continent.

Wool-growers will be pleased to note the firm tone in the London market. A half-penny a pound increase in the price of grease wool is more to this Colony than all the dividends of the Rand. Roughly it means about ten per cent. advance in the value of the staple product of the country.

It is to be regretted that the Table Bay Harbour Board cannot as yet manage to provide the cold storage for fruit which has been so long in contemplation. It may not, however, prove altogether a disadvantage. Larger and better markets are opening every day in South Africa, and if our fruit-growers can find consumers on this side instead of exporting the gain should be to the country.

Ranching prospects in the Kalahari have attracted attention once more. A company has been formed at Johannesburg to combine trading and cattle raising in those districts—wrongly called deserts. The area selected is between the Molopo and Lake N'Gami. Handled with care there is no reason why the venture should not succeed.

Mr. C. Forrest Rigg is supplying Johannesburg with poultry from the Colonization settlement in the Swellendam district. He has had a special railway truck elaborately fitted for the transport of poultry with a due regard to the requirements of food and water. The result is that the birds arrive in excellent condition, whilst the most eloquent testimony to the perfection of the transport arrangements is the fact that of a shipment of no less than 1,500 birds one only died in transit. This should serve as an encouragement to others to go and do likewise. The markets of the North are opening up fast, and the first to get there will secure the trade. We cannot all send poultry, but the same care bestowed on other products would doubtless bring as good results.

The Cradock Horticultural Society has been resuscitated, and hopes are expressed of an early resumption of active work. Its excellent exhibitions were always popular in the past.

It is gratifying to learn on the authority of the *Midland News* that the Angora Goat Breeders' Association has been kept alive right through the war, and has continued its work of registering pure-bred goats that have passed the inspectors. That this work should have been carried on in spite of the war and Martial Law restrictions is the most eloquent testimony to the characters of the men who have established and kept alive this Association, which should soon be looked upon as one of the most progressive enterprises in the country.

Wild dogs are creating havoc among the stock in the recently pacified districts in the Orange River Colony. While the country was unoccupied they followed nature's first law and banded themselves in packs to hunt for food. Their depredations among sheep are reported to be something serious.

Kuruman is boasting of mammoth vegetables. According to the *Bechuanaland News* "Mr. J. Howard, of Maroping, near Kuruman, lately dug a carrot weighing four pounds and a quarter, and in his garden are cauliflowers that you have to open both arms to reach round." This is quite dazzling, but the next paragraph rather discounts the glory. It reads:—"It is a good thing that vegetables grow well at Kuruman. There isn't much else there for people to eat. Mealie meal and greens have been their staple food for a long time. One man told our informant that he hadn't tasted bread for five months."

Veld fires are causing great destruction in Bechuanaland this year. They are supposed to have been started purposely on the unoccupied farms so that the game should come to the places where the grass is left. The local paper reports the whole country from Mafeking to Genesa as black for 40 miles. There is hardly a place where stock can graze to the south-west, flames are raging in the bush veld down the Mashowing, and there has practically been no break in the fires since the end of May.

The United States has become very much interested in the raising of choice Angora goats, says the *Washington Times*. Sixteen miles below Washington, in Maryland, the Government is conducting experiments with the Angora goat on the largest farm of the kind in the country. Fifty-one choice animals were recently shipped to ex-Secretary of the Navy Wm. C. Whitney's stock farm, near Boston, and 1,500 goats were sent to another big ranch at Oakland, Maryland.

For young men in the rural districts a course of study in an agricultural college is preferable to equipment for business life in a large city. There is a strong disposition among the growing generation, raised among wholesome country surroundings, to rush off to the metropolis and plunge into the nerve-destroying vortex of industrial activity, surrounded often-times by demoralizing influences. How much better it would be for the country youth to equip himself for an intelligent application of science in farming or stock raising. Ample rewards await those who are proficient in these lines. Life in a centre of population is, after all, mere existence as compared with the sense of freedom and exhilaration imparted by communion with nature in the fields and forests.

Many farmers will be pleased to learn of a new method of destroying baboons. Mr. F. B. Parkinson, F.R.G.S., states he has been very successful in the destruction of baboons by means of arsenic mixed with gum. The procedure is as follows:—A quantity of gum is collected from the mimosa (*acacia horrida*) and broken into small lumps, another portion of gum has water added to form a thick mucilage, and the arsenic is then stirred in till a stiff paste is obtained. Pieces of this paste the size of a mealie corn and containing about 20 grains of arsenic each are rolled in the broken pure gum, which sticks to it, forming a very attractive-looking bon-bon. These bon-bons soon dry and are then stuck on to the trunks of the trees at a sufficient height to be out of the way of domestic animals, where they resemble the natural gum and are greedily eaten by the baboons. Some thick gum is used for attaching the bon-bons to the trees, and several hundred doses can be set in a few hours.

FARM AND VELD.

SEASONABLE NOTES.

In spite of complaints in some quarters the heavy rainfall of the present season in the Western Province—particularly the Cape Peninsula—is generally accepted as the precursor of a good season. It is unfortunately true that some farmers have had to sow two or three times owing to the seed having been washed out in some cases, and in others because the heavier lands became packed with the continuous rains. Although it is the unexpected that always happens, experience and observation count for something. In the present instance the consensus of opinion among the more observant favours the belief that an abnormally wet winter indicates a good season to follow.

In the Eastern Province, of course, this is the dry season, and rains are badly wanted in several districts. If one is to follow the beliefs of the older farmers—and on the question of seasons they are usually fairly reliable—this state of things should not last very much longer. For some time past the prevailing winds have been westerly. This is usually followed by a sustained period of easterly winds, and with these should come the welcome south-easter that carries the spring rains back into the farthest corner of the Karoo. If the easterly winds are as continuous and forceful as the westerly sequence has been the Eastern Province and the Karoo should soon be putting on their best attire to welcome the springtime. Farmers should make careful note of these facts and be prepared with their arrangements in good time to take advantage of the season's opportunities.

It is in times such as these that the South African farmer feels the want of a well-conducted Weather Bureau. Perhaps it is going too far to say he feels the want of it because he has no experience of its uses and values. A well-appointed Meteorological Department that could make a study of the atmospheric circulation of the Indian Ocean in the same perfect manner as the United States studies the atmospheric currents of the Pacific and Atlantic could confer benefits of untold value to South Africa. On the Western side we have no need to trouble much. The atmospheric currents of the Atlantic have been proved to have a fairly consistent drift from west to east. This assures the fertility of the land in the route of those currents. But on the East we have still a great deal to learn, and as the conditions seem more variable there is the greater call for a closer study of the air currents of the Indian Ocean. In time, of course, the whole surface of the globe will be dotted with scientific watchers of the varying weather conditions eager to note every variation, and we shall know beforehand almost precisely the prospects of every season. In the meanwhile we must stick to our rule of thumb methods and rely upon the crude unregistered observations of the more thoughtful of the dwellers in the open.

Many correspondents have written lately on the question of pruning and one and all appear more or less alarmed lest they should be too late in applying the pruning shears to their trees. Experience teaches that here in the West this operation can be safely ventured upon up to at least the 15th of August. Many argue, and with plenty of justification, that trees pruned earlier in the season are prone to start before the season is sufficiently advanced and consequently are nipped by any belated cold snap that arrives. This sort of thing more often than not does so much damage to the buds that the whole crop is endangered, if not lost entirely. But when pruning on the latter plan, which we strongly advise, no material damage can be done but rather the reverse.

Of course these remarks refer to deciduous trees and not the citrous varieties. These latter, we have often advised and again reiterate, should never be touched with the knife other than to remove the deadwood and small wasted shoots from the centre. On no account should the low-hanging branches of the tree ever be interfered with. Nature supplies these as a protection to the surface roots—which are the feeding roots of the tree—from the heat of the sun's rays, and some growers out of sheer cussedness are only too fond of cutting them off only to find the vitality of the tree much impaired.

The planting season for American vines is just on. Farmers would do well to carefully scrutinise all young graftlings before planting them, where they are intended to stand. It pays far better to discard the weaklings or vines with suspicious joints rather than put them in and find that the first strong wind tears them from the stock as soon as they come into leaf. The farmers appear to be making great headway in the reconstitution of their vineyards. We are advised that from the Government Wine Farm at Great Constantia no less a number than 864,000 American vine cuttings have been distributed, chiefly of the variety known as the *Rupestris Metallica*.

The grafting of American vines may be commenced now. All who intend taking this work in hand are strongly advised not to accept any scions but those which have been taken from a mother plant which has been credited as a good bearer. Farmers know only too well the numbers of non-bearing vines to be found standing in their vineyards, and occupying ground which might otherwise be utilised for good bearers. To avoid the perpetuation of this sort of thing we strongly advise all vine-growers to be careful to obtain their grafting stuff only from those sources where they can depend upon getting a guarantee of the bearing qualities of the parent stock.

In the Western Province the season has so far been favourable on account of the steady and, at the same time, copious rains. Crops of all kinds are doing well, but a smaller output of cereals and oathay than last year must be anticipated, as farmers have been severely handicapped by the want of draught animals and shortness of labour during a time when they were mostly needed.

Fruit-tree plantations, particularly in the Stellenbosch and Paarl districts, are, judging from the present condition of trees, promising well, as the show of fruit-buds is in many instances most satisfactory. The output of French prunes, however, will, it is feared, be rather disappointing, as in the majority of cases trees were in bloom out of season.

This blooming out of season, which occurred during the latter part of March, was caused by the dropping of leaves at about the beginning of that month due to the prevalence of a fungus. There seems no doubt as to the bad influence of this fungus, which is found towards the end of summer on the lower side of the leaves. There are, unfortunately, indications of this fungus gradually spreading and invading new plantations year after year.

In one case, prune trees, which the year before had dropped their leaves at the normal time of the season, were absolutely bare in the middle of March and burst into full bloom towards the end of that month, showing about two weeks later quite a crop of young fruit, so that the prospects for a yield during the coming season are ruined.

This fungus also attacks other plum trees, notably the Cape Damson, Clyman, and the variety known here as Standard of England, whereas the Japanese plums appear to be resistant.

In view of the destructive influences of such fungus increasing year after year, unless preventive measures are employed, it would be well if growers were to give the Bordeaux mixture a good trial by spraying their trees with a fairly strong mixture before vegetation starts, following this treatment up with further sprayings during the months of October, November and December. So far as has been ascertained, encouraging results were achieved last season by this treatment in at least two instances.

August is the best month in the year to assail the scale insect pests of deciduous trees. The buds will begin breaking early next month, and then it will be too late to apply that most efficacious of scale destroyers, lime-sulphur-salt wash. This insecticide destroys few of the old scale insects at the time of spraying, but it fatally affects the young insects that appear through the spring. It checks the leaf curl disease that often nearly defoliates peach and nectarine trees, and also the shot hole disease of apricot, plum and prune trees. Moreover it kills the growth of lichens and mosses that forms on old trees in damp localities. A few growers think that the mixture tends to harden the bark and thereby do a little injury, but the general opinion is that the effect is more to soften the bark and thus to facilitate its expansion as new wood forms beneath. The later in the winter the spraying is done the more satisfactory are the results. Great care should be taken to wet the entire surface, that the young scale insects may not be able to find unprotected bark on which to settle.

Bordeaux mixture, applied late in the winter, suffices to prevent leaf curl and shot hole to a very great extent, and in a less degree checks the *Fusicladium* or Black Spot trouble so common on

the Saffron pear. It also destroys mosses and lichens, but it has little effect on scale insects.

The Blaauwbiesje (*Maltica indigacea*) and the Odontionopa Beetle (*Odontionopa sericea*) will soon be getting in their nefarious work on the swelling buds and tender foliage of apricot and other early blooming trees. The former is a steel blue beetle, about one-quarter of an inch long, and the latter a somewhat smaller metallic green beetle. The Blaauwbiesje comes about the middle of the month and feeds industriously on tongblaar (yellow dock) and allied plants. Towards the end of the month its yellow eggs are laid in clusters on the backs of the leaves of these plants, and a month later the new brood of beetles is mature and seemingly everywhere. The early stages of the Odontionopa are not known. The adults generally appear during the last week of August and become more and more numerous until the middle of September. They delight in feeding on the bark at the base of twigs, and thus kill the young growth by girdling it or by so weakening it that it breaks off in the first heavy wind; and where they are abundant they reduce the foliage to a network of veins. The Blaauwbiesje can easiest be controlled by suppressing the food plants of the larval insects, chiefly tongblaar and steenbokzuring (sorrel), about the orchard and gardens. Most of the breeding is done on the succulent, quick-growing plants that come up early along the ditches, and the destruction of these late in August or early in September does much to lessen the numbers of the second brood of adults. The Odontionopa is a more difficult pest to suppress, and jarring is the only practical measure that is known. The beetles fly readily if disturbed during the heat of the day, but at other times most of them simply let go their hold and drop. By jarring the trees, then, and catching those that fall on cloths, the numbers may be greatly reduced. Although this measure may not always pay in the case of large trees, it should not be neglected in the case of small ones, and should be begun as soon as the beetles make their appearance.

The Calandra (*Phlyctinus callosus*) is another insect to which attention is often required as soon as the buds swell. This insect is best known as a vine pest, and it is to newly grafted vines that it causes most damage early in the season. The Calandra passes its larval and pupal stages in the soil, the larva working on the roots, but it is only the adult or beetle stage that is known as a pest. Some of the adults survive the winter under the back of vine-sticks, under stones, or in rubbish, and start to feed on the buds as soon as these begin to grow, thus doing immense mischief with little feeding. Early in November the new brood of beetles emerges from the ground, but despite the overwhelming numbers of the new-comers, the major part of the damage has probably been done, as the foliage by that time is well out. No better remedy is anywhere practised

for such a pest as the Calandra than the one followed at the Cape, namely, that of trapping the beetles in loose wads of leaves. Fir cones from which the seeds have fallen are often used as a substitute for leaf "pockets" in early spring if no suitable foliage is at hand. It is the habit of the beetles to feed at night, and if the pockets are laid conveniently for them, numbers will hide therein for the day and there be readily found and destroyed. The beetles are very fond of beet tops, and beets or mangels are sometimes planted between rows of young vines for the sole purpose of diverting the attack. When it is possible to easily avoid doing so, young vines, and especially newly grafted vines, should not be planted in ground recently occupied by old vines, fruit trees, or other growth that was infested by the insect.

Another six weeks or two months will see the dipping season in full swing; and after the drawbacks and losses occasioned by the war, a thorough and systematic dipping of all sheep, whether clean or infected, is more than ever necessary. Isolated action, such as one farmer dipping in October, and his neighbour performing the same operation six weeks or two months later, is to be condemned. What is required, is a simultaneous dipping of all flocks within as short a period as possible. To effect this end the farmer should spare neither expense nor trouble, and the aim of each stock-owner should be to carry out the operation in a thorough and systematic manner.

Whilst dipping is being carried out the stock-owner should exercise great care in the collection of his sheep. Even after the flock has been brought to the dipping tank, the farmer should have his ground thoroughly scoured and every stray animal brought to the homestead and dipped. It frequently happens that carelessness on this point occasions the re-dipping of all sheep running on the farm, owing to one or two stray animals having been overlooked, and subsequently rejoining the flock.

Another important point is the pasture on which infected sheep have been grazing. If possible, when dipping has been completed the sheep should be moved to clean and healthy veld, and the old ground utilized for cattle and horses or left entirely vacant until all danger of re-infection has ceased to exist.

As regards the dipping, a few hints may prove of use to the farmer and assist him in the cleansing of his stock.

- (a) Having selected the most approved dip, adhere strictly to the directions given for the use of the ingredients.
- (b) Each animal which shows hard or crushed scab should be caught before being tanked, and all the diseased spots thoroughly softened with a solution of dip.

- (c) The work of dipping should not be hurried in any way; the sheep should be placed carefully in the tank, and kept there from one to two minutes, until every part of the body has been well saturated.
- (d) Always cease dipping so as to allow of the places drying before sunset.
- (e) Repeat the dipping at an interval of from 12 to 16 days, and on no account allow the flock to occupy the old kraals or sleeping places.

The Golden Rule which might be applied at the dipping season is Do not hurry your work."

QUERIES AND REPLIES.

Boxes and Packing for Fruit.

A correspondent in the Eastern Province writes asking to be informed where he can best obtain packing and cases for fruit.

For the benefit of those fruit-growers who may not be fully aware of the system pursued, and for those who may be taking to this branch of industry in the future, we may state that the business of procuring cases and packing for fruit is arranged through the various Fruit Growers' Associations. An application to the Secretary of the Fruit Growers' Association of the District will secure all the material needed. It is procured from Messrs. Panton & Co., of London, who are found the most satisfactory firm for the purpose. And as the material has to be brought such a distance it is necessary to order ahead.

A Pest of Ants.

A correspondent in the North-Eastern Districts writes complaining of a plague of white ants (Rijs Mieren) in his house, about the house and even in the veld and garden. He has been supplied with a copy of a reprint from the *Agricultural Journal* of August, 1899, in which the Government Entomologist, Mr. Lounsbury, deals in some detail with this question. But as the pest of ants of various kinds is a common affliction in so many parts of the Colony it would be a distinct advantage if some of our numerous readers would supply the results of their experiences, and if anyone has found a really workable and reliable scheme of extermination it would be of value to have it on record.

Can Cattle Inoculated for Lung-sickness Infect Healthy Uninoculated Cattle if Mixed?

This is a question which has given rise to a great deal of discussion. Many observers maintain that the disease may be contracted from infected buildings, kraals or pastures, the manure of affected animals, or from the carcasses of those which have died of the disease, or even from chewing the bleached bones of affected animals which have died on the veld. There is, however, no direct experimental evidence that the disease can be communicated in any other way than for a susceptible animal to come near enough to a living affected animal to enable it to inhale the germs of the disease as they are expired from the lungs of the latter in the breath. It is quite true that the lymph or virus obtained from the lungs of an affected animal may retain its vitality for months if properly preserved in ice, but there is no direct evidence to show that the infective material preserved in any such manner is capable of gaining an entrance into the lungs of healthy susceptible cattle in the ordinary way, by inspiration, and giving rise to the disease. The experiment has frequently been made of placing the diseased lungs of newly slaughtered cattle in the feeding troughs of healthy cattle, but the results have always been negative.

In like manner, it is a fact recognised by all accurate observers that healthy uninoculated cattle may mix freely with inoculated cattle, even when extensive swellings have followed the operation—and yet they invariably escape infection, if there are no diseased animals in the inoculated herd. Further, the practice of “drenching,” that is, administering by the mouth, a certain quantity of the serous exudation found in the chest of an affected animal, if carefully done, does not communicate the disease to the animal drenched, although it confers an immunity. Yet one would imagine that it would scarcely be possible for the animal to avoid inhaling the infection, when swallowing a liquid charged with it. In like manner, it is difficult to explain why healthy susceptible cattle do not inhale the infective organisms of lung-sickness when they smell the specific swellings which so frequently follow the operation of inoculation, seeing that these organisms exist in these swellings in an active state, at the temperature of the animal body; but the fact remains that the infection is not communicated by these inoculation swellings, any more than vaccinia is communicated from a vaccinated person to an unvaccinated, except by direct inoculation.

D. HUTCHESON, C.V.S.

Fodder Plants for the Karoo.

Mr. Herbert H. W. Lindsay, of Droogefontein, P.O. Dwaal, writes:—

For a long time I have been wondering is there no seed to be had which we Karoo farmers could broadcast on our veld (in a rough

sort of way) and from which feeding or grazing for stock would result. A friend of mine informs me that in America there exists a grass known as "Johnstone Grass" which makes excellent grazing. From what he tells me I gather the seed can be sown on the dry ground and in a short time grow most luxuriantly. If you know anything of this grass I shall be glad to have all possible and useful information.

COPY OF GOVERNMENT BOTANIST'S REPORT ON FODDER PLANTS.

Correspondent should consult the very numerous papers which have appeared in the *Agricultural Journal* upon fodder plants and thus obtain the current information upon the subject. I recommend the section of our reprints under the title of *Agricultural Miscellanea*.

Sorghum halepense, the grass which the Americans have given the absurd name of "Johnson Grass," is one of the fodders or supposed fodders, like "Teosinee" and "Wagner's Pea," introduced by speculative seedsmen and praised far beyond their worth just to make sales and rake in the money. It is rarely heard of now, though praised up greatly in the early nineties. Perhaps I had better take over a passage from the experience of N.S.W. farmers with it:—

"It is of no use as a fodder plant in this district. It is of no value and is a great trouble to get rid of after we once get it to grow, and all who have sowed it wish they had never seen the thing. No one who ever saw the Johnson Grass growing would have anything to do with it. It grows very coarse and tall, and very hard. No cattle will eat while there are any other kinds of grass."—*N.S.W. Agricultural Gazette* iii. 241-2 (1893).

Furthermore, *S. halepense* is a native, or an introduction to this country now acclimatized, just as it is in most warm climates of similar latitude. I have had it sent to me as a wild grass from along the Orange River, the north part of the district of Herbert, where it grows on overflowed places much as the common reed does, and is not sought after by cattle.

The more important counsel to give to correspondent is that, in expecting to get a stand of *fodder grass* in the Karoo, he is working in opposition to the climatic conditions prevailing in that very peculiar and specialized region. A thoughtful observation of a Karoo farm and its surface fodder production will force the conclusion that the food value of the veld there *depends upon dwarf bushes* of several kinds, which grow socially, and with alternate use and rest will provide a magnificent stand-by in all seasons and from year to year.

For grass-veld one must go to the Eastern Province with its summer rains; in the Karoo the conditions do not permit of a grass crop, but give immense provision of wholesome and fattening Karoo-boschjes. The best of these is the "Goed-Karoo"—*Pentzia virgata*,

and I recommend correspondent to turn his energies to its multiplication by sowing in damp weather, covering the seed furrows and keeping stock off it till the plantlets are up and established. Merely scattering seed over the unbroken veld is utterly useless waste of seed and labour. No man would treat a crop of barley or wheat in such fashion. For other specially suitable Karoo fodder, see my often reprinted paper on "Stock Food Plants," say, in *Agricultural Miscellanea*—p. 165.

(Sgd.) P. MACOWAN,

Government Botanist.

A Tender-mouthed Horse.

Mr. Abr. J. Perold, of Daljosaphat, Paarl, asks: "What is the best means of accustoming a weak-mouthed horse to the bit; or in other words, to harden its mouth? Does an 'elastic bit' harden or soften a horse's mouth?"

A rubber-covered snaffle is really the best thing for a tender mouth. The South African farmer, as a rule, does not devote sufficient attention to the mouthing of horses. If the horse is young and only just broken he should have a mouthing bit on him every day till he gets used to the feel of it. If he is to be driven a rubber-covered bit should be used.

A Debilitated Horse.

The same correspondent puts the following query: "Some time back I purchased a military horse, which had done service at the front (it is an imported animal). Because of its poverty I fed it well and administered medicine to bring it into condition. After the lapse of a couple of weeks the animal developed a bad swelling which extended from the chest through the legs to near the stomach. I treated this swelling with poultices, and after the expiration of a few days I opened it just behind the horse's fore-legs, and much matter was emitted. Before this had healed, however, the whole of its right hind-leg began to swell badly. In spite of every effort this swelling would not disappear, until I had obtained some medicine from an apothecary wherewith I kept the leg moist; and it eventually healed. There were no symptoms of 'Farcy.' I have been informed since that there were other similar cases in this locality. Can you give me any information regarding the above, especially as to the treatment of such cases?"

This animal was evidently suffering from extreme debility probably brought on by overwork, and was slightly dropsical. This

would naturally mean an impaired circulation, which will disappear as soon as he gets into decent condition again. We would recommend Mr. Perold to give him plenty of good succulent, nourishing food, plenty of fresh air, keep him warm, and give him gentle exercise till he recovers.

Spray Pumps.

This is query No. 3 from the same source: "Can a mixture of lime, sulphur and salt be used with the 'Success Spray Pump' without the piston-rod, which is copper, being injured by the sulphur?"

No; it is not safe to use with copper utensils of any kind as it injures the copper. A copy of the "Spray Calendar" and "The Use of the Spray Pump" have been forwarded you by post.

Myrobalan Plum Stock.

The same correspondent adds this as his fourth question: "I notice in the *Agricultural Journal* of the 5th June last that the 'Myrobalan Plum Stock' is recommended for grafting, because it gives good roots and no suckers. Some of the farmers hereabouts complain that the 'Myrobalan Plum Stock' gives so many suckers on their farms that they have found it advisable to remove it. In some cases the trees are planted in dry sandy soil. Will the ground have anything to do with it, or is it perhaps not the right variety of stock (at all events they allege that it is the Myrobalan Stock)."

It is all a question of the soil. Yours is evidently too light. If you will turn to Pickstone's "Hints on Fruit Growing," page 20, or refer to back numbers of the *Journal*, you will find the whole case of the Myrobalan Plum fully stated. Pickstone makes it all perfectly clear, and we cannot do better than quote his words in the admirable work referred to: "Of the domestic plums very few do well worked direct on to peach root. Most of the well-known varieties make so imperfect a junction that we have had to stop attempting any result. Almost all of them do well on Myrobalan as far as making a junction is concerned, but except on soil which is adapted for the Myrobalan, that is to say a stiff heavy soil, the growth of the tree is not satisfactory; in most instances, therefore, in dealing with the domestic plums on Myrobalan we have a perfect junction (which we do not get in the case of the peach root) but a not altogether satisfactory later result (except on the stiff soil, where it is most excellent and satisfactory)."

The italics are ours.

THE OUTBREAK OF GLANDERS.

It is unfortunately the fact that Glanders has broken out in almost epidemic form in many parts of the Colony, and it behoves dealers in, and owners of, horses to exercise the greatest care to avoid serious loss from the ravages of this deadly disease. A great deal has been written on this subject at one time and another, but for all practical purposes the article by Dr. Hutcheon, C. V.S., published in his invaluable Handbook, "Diseases of the Horse and their Treatment," has not yet been surpassed. Treating therein of Glanders and Farcy the author writes as under:—

CAUSE.

Glanders is a contagious disease, and is due to a special contagious virus, which contains a living micro-organism, or disease producing seed. This is its sole originating cause. It does not arise spontaneously under any known conditions, neither can any other disease of the air passages develop into glanders, however much neglected. It is not considered to be infectious by the breath, it is a purely contagious disease, the virus requiring to come into actual contact with the mucous membrane, or with some abraded surface of the skin, before infection can take place. It is readily communicable to man, goats, sheep, and the dog, by means of inoculation, but it affects horses, mules and donkeys more particularly; cattle and poultry do not take it.

SYMPTOMS.

The first observable symptom is generally a slight discharge, most frequently from one nostril only, but it may be from both. This discharge increases, is of a bluish yellow colour, like finely made thin starch, and is of an adhesive character, sticking to the edges of the nostrils. The lymphatic glands inside the lower jaw become swollen and hard, and show no tendency to ripen or come to a head, even though a severe blister may be applied to them. If the inside of the nostrils is carefully examined little yellow elevated pimples will be seen, which soon form into small ulcers. The mucous membrane lining the nostrils presents a purplish colour, and not the pink colour of health. These symptoms become aggravated, the ulcers become deeper, coalesce, and in many cases a large hole is ulcerated right through the cartilage dividing the nostrils; the discharge from the nostrils, in such cases, becomes bloody. In other cases the mucous membrane is covered by a thick layer of cancerous-looking tissue. The animal appears unthrifty-looking, hide-bound, the eyes red, and weeping, and there is a sniffing sound in the nostrils when breathing.

In many cases of glanders in this Colony, however, the disease assumes a chronic form, the horse appears in perfect health, with the exception of the discharge from the nostrils and the swollen glands inside the lower jaw. He will feed well, do his work well, and look sleek and fat. These are the cases which are allowed to live and poison the whole of the horses in a stud. In all cases where there is a sticky, starchy-looking discharge from the nostrils, a hard swelling of the glands inside the lower jaw, with yellow pimples or small ulcers on the membrane lining the nostrils, no hesitation should be entertained regarding the nature of the disease. Even before any pimples or ulcers appear in the nostrils, if a discharge commences from the nostrils without any appearance of a cold, sore throat, or strangles to account for it, it is always suspicious and the animal should be isolated at once. Horses affected with chronic glanders may live two or more years if they have plenty of food, and not overworked. Hard work, insufficient food and exposure generally cause the disease to assume an acute and rapidly fatal form, hence a good test for glanders is to bleed the horse well, when the disease generally develops its characteristic appearance rapidly.

SYMPTOMS OF FARCY.

The lymphatics inside the fore or hind legs or along the side of the neck are swollen, and feel like thick cords, very painful to touch; small round swellings appear on the course of these cords, which ultimately burst, and discharge a yellow glary fluid, leaving raw, jagged sores. There is generally a diffused swelling of the affected limb also. In many cases the farcy buds may form in an irregular manner, around the fetlock joints or in other situations of the body. Acute farcy generally ends in glanders, and acute glanders generally breaks out in farcy buds all over the body, if the animal is allowed to live long enough. Many cases of chronic farcy may temporarily recover, but it is not policy to keep any horse which shows the characteristic appearances of either form of the disease.

TREATMENT.

This should be preventive solely. As soon as one case of glanders or farcy has made its appearance amongst a stud of horses, every horse should be carefully examined, and as soon as the least appearance of discharge from the nostrils is observed that animal should be isolated from the troop at once, and carefully watched, *and destroyed as soon as the symptoms of glanders are manifest.* By careful observation, and prompt action, glanders may be stamped out of a stud very readily, because, being a purely contagious disease, no harm is done until a discharge appears.

DISINFECTION.

If the affected animals have been in a stable everything in the stable must be thoroughly cleaned and disinfected. The walls

cleaned and washed with quick lime, adding four ounces of crude carbolic acid to each gallon of lime wash. The floor must be cleaned in the same way, and well disinfected, all woodwork must be scoured with caustic soda and hot water, and disinfected with a strong solution of carbolic acid. Harness, and stable utensils of every kind, must be treated in a similar manner.

As the period of latency, that is, the period which elapses between the date when the animal becomes infected and the first appearance of the visible symptoms of the disease, is very indefinite, from ten days to as many months, it is necessary to carefully watch a stud, which has been exposed to contagion for a long time, lest any cases appear.

This is supplemented by the following valuable instructions in the Annual Report of the C.V.S. for 1900:—

MALLEIN.

“Mallein is an analogous preparation to Tuberculin. It is prepared by growing a virulent glanders bacillus in glycerine veal broth, in flat flasks such as are employed for tuberculin, so that there is free access of oxygen for a month or six weeks. It is then autoclaved for fifteen minutes at 115° C., filtered through a Berkefeld filter, concentrated to one-fourth of its volume, and mixed with an equal volume of a half per cent. solution of carbolic acid.”—(Hewlett.)

Mallein is used principally for the diagnosis of glanders in the equine species, and its discovery has completely changed our methods of dealing with that disease. Before mallein was available, the diagnosis of many cases which presented some suspicious symptoms was most difficult, whilst the detection of those latent cases, in which there are no visible symptoms, was impossible. With the aid of mallein, the diagnosis of such cases is now an easy matter, and practically certain when it is used with skill and judgment.

The following are the

DIRECTIONS FOR USING MALLEIN.

1. Horses that are to be submitted to the mallein test should be left at rest in the stable the day before the test is applied, and protected from draught and any great changes of temperature, and should have their temperatures taken in the morning first, and again in the evening when the test is applied. Should any animal exhibit a high or irregular temperature it should be kept over for a day or two for further observation before being tested.

2. The dose of mallein for the horse is one to two c.c., depending on its concentration. It ought to be injected about the middle of the side of the neck, with a clean hypodermic syringe. The best form of syringe is one with an asbestos piston, as the whole instrument may then be sterilized by boiling it in water for five minutes before use.

3. The mallein must be injected into the subcutaneous connective tissue, and care must be taken that the whole dose is actually introduced.

4. The temperature must be taken at the time of injection, and at the 9th, 12th and 15th hours afterwards.

5. Provided the temperature was normal (under 101° F.) before the injection, it will rise 2° or more (103° - 105°) during the next 15 hours if the horse is glandered, but it will remain practically unaffected (under 102°) if the horse is not glandered.

6. Attention must also be paid to the swelling that forms at the seat of injection. When the horse is glandered this goes on increasing in size during the second 24 hours after the injection, and it seldom declines before the 3rd or 4th day. The maximum diameter of this swelling in glandered horses varies from 5 to 10 inches.

7. In horses that are not glandered the local swelling attains its maximum size during the first 15 hours, and by the 24th hour it has almost entirely disappeared. Its maximum diameter is usually about 3 or 4 inches.

8. When the temperature gradually rises from the normal to 104° during the first 15 hours, and a large slowly disappearing swelling forms at the seat of injection, the horse may confidently be declared glandered.

9. If, with a normal temperature at the time of injection, a horse displays only the temperature reaction, or only the local reaction, the case must be considered doubtful, and the test repeated after the lapse of a week.

10. When the temperature is 102° or more at the time of injection the temperature reaction is unreliable, but in such a case the diagnosis may be based on the characters of the local swelling.

11. The mallein should be kept in a cool place, and protected from the light. Should it lose its transparency, or become cloudy, it must not be used.

CURATIVE ACTION OF MALLEIN.

Horses either recover naturally from glanders, or mallein exercises a curative effect. This is very evident from the fact that many horses which give a decided double reaction to the mallein test when applied for the first, second, third, and even fourth time, ultimately cease to react and do not show visible symptoms of glanders subsequently, at least not for a very long period. How far their recovery is due to the action of mallein is not yet clearly demonstrated. Professor McFadyean says:—"Prior to the days of mallein glanders was never detected during life, except when the animal developed external symptoms; hence the past does not furnish us with a particle of evidence that is incompatible with the view that very many horses become affected with glanders and yet recover." It has been clearly demonstrated during our somewhat unusual experience lately, that the horses with the smallest number of tubercles in the lungs often

give the strongest reactions to the mallein test. For example, we had a horse recently which gave a strong double reaction at the first, second and third mallein tests, when he was killed, and on *post-mortem* examination made by my assistants, Messrs. Robertson and Armstrong, they were only able to discover one small tubercle in the lung after most careful search in all the glandular structures of the body. Now if this animal had belonged to a private owner we would have had a difficulty in convincing him that there was any evidence of glanders present in the carcase. If we consider that the first mallein test was applied to this horse nine weeks before he was killed it will be evident that the disease made little or no progress during the interval, and that there is every probability that it would have been completely arrested. We have examined a large number of similar cases amongst the cast military horses, in which we found, *post-mortem*, only two or three tubercles in the lungs, although the animals had been tested twice and were under observation from one to two months. It is satisfactory to be able to state that we have never obtained the characteristic double reactions to the mallein test without discovering evidence of the presence of glanders on making a *post-mortem* examination, and this is the experience of the majority of those who have used mallein largely; those who have used it most express the greatest confidence in its diagnostic value.

ARE HORSES THAT REACT TO THE MALLEIN TEST DANGEROUS TO OTHERS.

It is generally agreed that the infection of glanders is not given off by the affected animal in its breath, hence it may be argued that until there is some visible discharge from the nostrils, such an animal could not be dangerous to others. But it would be impossible for anyone to say when such a horse would begin to be dangerous, because before there would be sufficient discharge from the nostrils of an infected horse to attract the attention of an ordinary observer, much mischief might be already done. Besides, a horse with tubercles in the lungs may cough up infective matter long before there is any visible discharge from the nostrils. The only safe course, therefore, is to treat every animal that reacts to the mallein test as dangerous, and to keep it isolated until it either ceases to react, when it can be returned to stud, or it begins to manifest symptoms of the disease, when it should be immediately destroyed. There is, however, no reason why such an animal should be stopped from work while it manifests no symptoms of the disease, so long as satisfactory arrangements can be made for it to be worked, fed and watered completely separate from the healthy horses of the farm or stud.

DEVELOPMENT OF THE VISIBLE SYMPTOMS OF GLANDERS.

The public have a difficulty in fully apprehending the irregularity which occurs in the development of the visible symptoms of glanders, after the animal has reacted to the mallein test. From Nocard's

experiments, it would appear that a horse will react to the mallein test within eighteen days of infection by ingestion, indicating that glanders lesions have already become established; but that horse may not manifest visible symptoms of glanders for many months, or even years, or he may cease to react altogether, and never show any external appearance of infection. It is impossible to predict what the course of the disease will be in a horse that becomes affected with glanders, and gives the characteristic reaction to the mallein test. He may develop visible symptoms at any time, or he may live on for years, and never exhibit any external appearance of infection.

MALLEIN SHOULD BE UNDER GOVERNMENT CONTROL.

I am decidedly of opinion that the Government should exercise control over the sale and use of mallein in this Colony. Every facility should be given to owners of horses to test their animals when they express a desire to do so, but unless some control is kept over its use, unprincipled men who recognise the diagnostic value of mallein might test their suspected studs, not with the object of clearing them of glanders, but with the less commendable object of selling every horse that gave a characteristic reaction, and thus be the means of spreading the disease far and wide.

SUPPRESSIVE MEASURES.

In order to deal effectively with outbreaks of glanders, it is necessary that the Government should obtain authority to kill all animals that manifest symptoms of being affected; and by a visible symptom I do not mean the diagnostic symptoms of glanders in an advanced stage—such as ulceration of the mucous membrane of the nostrils, with the characteristic swelling of the submaxillary glands, or glanderous nodules in the skin. Such pronounced cases can be dealt with under the existing Act No. 27 of 1893, and no one objects to such animals being destroyed; but rather an animal with a chronic or suspicious discharge from the nostrils, and which gives the characteristic double reaction to the mallein test, should also be destroyed immediately. Further, we should have power to apply the mallein test to all animals which are known to have been in contact with visibly affected cases, and to permanently isolate those that give a distinct reaction to the mallein test, although they may exhibit no other visible symptom of being affected.

As already remarked, there is no objection to the owner being allowed to work such suspicious animals if satisfactory arrangements can be made for their being worked, fed, watered and stabled entirely separate from all other healthy horses of the farm or stud; but the owner should be debarred from parting with any such animal until it has been certified by some competent authority as being free from infection by reason of its ceasing to react to the mallein test, which should be applied at intervals of a month or

longer. Where it is practically impossible to arrange such complete isolation, they should be destroyed, but compulsory slaughter of such animals should be accompanied by a certain amount of compensation, not less than a third of their value, because—as has already been shown—these animals may work for months before they manifest any symptoms of the disease, or they may cease to react, indicating that they had recovered, when they would be passed as healthy horses and at the owner's disposal.

DISINFECTION.

It is now recognised generally that the infective material of glanders comes from the air passages; and is not exhaled with the breath in the form of vapour, but is contained in the discharge which flows from the mucous membrane of the air passages in such cases. It is also contained in the fluid contents of the ulcers in cutaneous glanders. Those who believe that infection takes place through the respiratory organs are of opinion that the infective material which is discharged from the nostrils becomes dry, and is then inhaled by healthy animals in the form of dust particles. Of course, it may be taken in with the food in any form, moist or dry.

Glanders may therefore be transmitted from an affected to a healthy animal directly or indirectly. Directly by close contact of an affected with a healthy animal; or indirectly through healthy animals eating out of the same manger or drinking out of the same bucket that has been used for a glandered horse. The stable walls, stalls, floors, bedding and utensils may also be mediums of infection, as horses are very liable to lick or chew any of these and thereby ingest the virus; and if the infection is liable to be inhaled along with particles of dust when the stable is being swept it points to the necessity of thoroughly cleaning and disinfecting the floor, as well as the walls, stalls and mangers. Before the originating cause of glanders was discovered the popular opinion was that the infective material of glanders was one of the most difficult to kill or remove. This arose from the fact that it was so difficult, with the means at our disposal, to eradicate the disease from a stud of horses when once it had got established. This was not due, however, to the strong vitality of the infective agent of glanders, but to the slow development of the disease in the lungs of the affected animals. In many cases the affected animal might not manifest any visible symptoms of the disease for months, or even years, after infection, but it might, during the interval, be capable of communicating the disease to healthy animals in immediate contact with it.

When an outbreak of glanders occurred in a stud of horses the usual practice was to kill every animal that manifested any symptoms of being affected. The stable, harness and all stable utensils were thoroughly cleaned and disinfected. But no matter how carefully these precautionary measures were carried out, in the great majority of instances fresh cases would reappear at short intervals. At each

of these outbreaks increased vigilance would be exercised and more vigorous disinfecting measures adopted; all woodwork would be burnt, the plaster stripped off the walls, and in many instances the stables completely destroyed; but even then the disease would not be arrested, simply because the infection was not left in the stable surroundings, but in the infected but healthy-looking animal in the stud; and until the discovery of mallein we possessed no means of discovering these obscure cases. Now all this is changed, and it is an owner's own fault if he leaves any affected animals in his stud.

With respect to the vitality of the infective agent of glanders—the bacillus mallei—it is quite as easily destroyed as many other infective organisms. According to Löffler, the bacillus mallei lives three months in a dry condition, but the majority of authorities find that it dies in ten days when exposed to sunlight. It may remain alive a long time in a dark, closed stable. When exposed to heat, the bacilli are killed at once at 100° C., or 212° Fah., and at 80° C. in five minutes. Exposed to the action of corrosive sublimate 1 in 1000, they are killed in fifteen minutes; and in a 5 per cent. solution of carbolic acid, Jeyes' fluid, &c., in an hour. It will be observed, therefore, that boiling water and sunlight are two of the most efficient as well as most economical disinfectants. All the woodwork, stalls, mangers, &c., of an infected stable should be scoured with caustic soda and hot water, to remove the glutinous discharges, which are very adhesive. The walls and floor thoroughly washed with boiling water, with five per cent. of carbolic acid or Jeyes' fluid added; or one ounce of powdered corrosive sublimate to six gallons of water. The latter is the most efficient disinfectant, but as it is a strong poison, it requires to be used with very great care. All rugs, bandages, and similar articles can be steeped in boiling water containing the disinfectant; but for harness water below boiling point must be used. If an infected stable is thoroughly cleaned and disinfected as above indicated, fresh healthy animals may be placed in it immediately without danger, care being taken that there is no suspicious animal amongst them.

All the world is looking to South Africa. Says a Texas journal:—It's an ill wind that blows nobody good. Restoration of peace in South Africa has transferred the field of activity in live stock from the Missouri mule camps to the Texas cattle marts. New blood is to be infused into the veld by an English firm, which has begun shipping American-bred beeves to the dark continent to take the place of those destroyed during the war. Walter de S. Maude, one member of the company, is a former owner of the Moon ranch in the Panhandle country, and at present ranks as a major in the British Army. His partner, Richard Carrow, owns the Windhorst ranch in Clay County. They have certainly hit upon a novel enterprise, but one which, to all appearances, will be remunerative.

UNKNOWN INFECTIOUS MATTER.

AN ESSAY BY DR. ERNST JOEST, CONDUCTOR OF THE BACTERIOLOGICAL
BRANCH OF THE GANS PHARMACEUTICAL INSTITUTE, IN FRANKFORT-
ON-THE-MAIN.—*Condensed from "Centralblatt."*

In his introduction Dr. Joest refers to the whole string of diseases which, from their characteristics, are claimed as infectious but of which the morbid or infective agents are not known, although many of them have been the subject of accurate investigation for years. He says:—

If we take into consideration every kind of infective substance which can at all take a part as ætiological agents in the excitement of disease we arrive at the following classification of the infective substances:—

1. Living Infective Substances:

(a) Micro-organisms.

I. Micro-organisms, morphologically known and in part (a) able to be cultivated:

(a) Bacteria.

(b) Protozoa.

(c) Other vegetable or animal micro-parasites.

2. Micro-organisms at present morphologically unknown and uncultivable:

(a) Micro-organisms which can be perceived by aid of a microscope, but which nevertheless for special reasons cannot yet be found, *i.e.* identified as morbid agents.

(b) Micro-organisms not perceptible to the microscope, because being beyond the limit of visibility.

3. "Contagia viva fluida."

II. Inanimate (chemical) infectious substances (intoxicating substances):

Into this schedule we can put all kinds of infectious substances.

He excludes group (a), which embraces the known infective agents, and enters into a brief discussion relative to the impossibility of inanimate agents producing real infection, that illnesses caused by inanimate substances must be considered as intoxications. He then enters into a consideration of the question whether there exist inanimate (chemical) infectious substances, which leads him into a discussion of the difference between inanimate and living matter. One of the chief distinctions between inanimate and living substances is founded on the fact that the atoms composing a molecule of the former are intra-molecularly in a state of stable equilibrium, a relative state of rest, whereas a part of the highly complex

molecule of the living substance constantly undergoes changes in its composition. These intra-molecular changes we conceive as the metabolism—or chemical processes of the living matter, which is accompanied by the liberation of energy in its various forms, etc. After referring to the manner in which living substances are nourished, he says:—The living substance always possesses shape, its primary form is the cell with its differentiations. “There exists no living substance that is not arranged in cells. All functions of life, as the highest of which we must recognize the power of multiplying, are bound to the organized cell.”

Applying these facts to the micro-organisms which cause disease he says:—“Whereas most micro-organisms live in dead organic matter—(of animal or vegetable origin)—the living body of a plant or animal serves as a feeding ground for the pathogenic micro-organisms. This feeding ground suffers changes just as the dead nutritive material does by the micro-organisms growing in it. These changes, to which are often added the purely mechanical effects of the micro-organisms, result in damage to the living body substance and find their expression in disease.”

Again: The pathogenic micro-organisms act in a manner tending to disease:

1. By chemical and physical change of the body substances, whereby materials may be created which are at the same time harmful to the body substance.
2. By using up the living body substance.
3. By giving off products during their metabolic changes which harm the living body substance.
4. Mechanical obstruction of the vital action of the body substance.

INFECTION AND INTOXICATION.

The fact that living infectious substances—(micro-organisms)—are capable of causing disease even when introduced in very small numbers, must be attributed to their power of multiplication, because the mere presence of this small number of organisms in the body would be incapable of producing any damaging effect. It is their rapid multiplication and the chemical changes which they produce in the body substance which causes disease.

There are inanimate substances also which produce disease when introduced in very small quantities, but these are special substances which always act in the same manner and in the same doses, and are called intoxicants.

With respect to intoxications that simulate real infectious diseases, if we except the poisonous vegetable alkaloids, we must here take into consideration almost exclusively substances whose creation (outside the human or animal organism) can be traced back to micro-organisms. Such substances are *either* descended from the dead or living nutritive matter made use of by micro-organisms—they are products of the separation or decomposition of the nutritive matter

(mostly albuminous substances) or they are component parts of the body of the micro-organism, *i.e.*, immediate descendants (secretion products) thereof. The micro-organisms to be taken into account for the intoxications here to be observed in the light of manufacturers of poisonous substance are mostly saprophytes.

Not alone bacteria, but also numerous other low, vegetable organisms (hyphomycetes, &c.) produce directly or indirectly substances which if embodied in the animal body can result in damage thereto.*

Toxins.† The before-named pathogenous substances which can be traced back to micro-organisms, but are in their effect independent of their procreators, may be of a kind that they can exert an intense poisonous effect already in very small quantities. The poisonous substances (toxins) generated in dead nutritive matter (of animal or vegetable nature) under the influence of micro-organisms are mostly of a kind similar to alkaloids; they are known as ptomaines, whereas the poisons, produced by the bacterium-cell itself, and closely connected with the albumin-particles, are called toxalbumins.

In what minute quantities certain toxins can exert a poisonous effect resulting in the death of the body of an animal is best shown by the poisons produced by some pathogenous bacteria (*Diphtheria-bacillus*, *Tetanus-bacillus*). These surpass in toxicity even the most poisonous alkaloids (*e.g.*, strychnine) to a considerable degree. The poison acting most intensely, which we know, would appear to be tetanus toxin—for 0.00000033 ccm. of a strong toxin suffice (according to Diendoné) to kill a guinea-pig of 300 grammes. (The deadly dose of strychnine would be about 0.0015 grammes.)

As the intoxications by toxins mostly entail a severe general illness, as, moreover, their pathologic-anatomical appearance not unfrequently shows great resemblance to that of real acute infectious diseases, acute infective diseases may easily be simulated by such intoxications, especially when several individuals are simultaneously affected. (How we proceed in order to distinguish intoxication and infection differential-diagnostics, we will discuss lower down.)

Several illnesses of man and the domestic animals may serve as an example of the occurrence of such intoxications. Firstly, the intoxications designated as meat and sausage poisonings (*Botulismus*) belong here. The toxin-forming saprophyte is here frequently the *bacillus botulinus*. The toxicity of the botulismus-poison is a very high one. As the *bacillus botulinus* is unable to grow in the living animal body, we have here to deal with a pure intoxication. Further,

* As soon as the micro-organisms themselves enter the body in masses and these substances are formed by them within the affected body, we have no longer to deal with a pure intoxication, but with a complication of infection and intoxication.

† I here collect under the name "toxins," which Brieger originally used for the N-containing, highly poisonous bases obtained by him out of decaying matter, all specifically poisonous substances generated by micro-organisms, whether they originate in the nutritive medium or the body of the micro-organism.

we would have to mention a string of diseases of the domestic animals, known as "Fungus-poisonings." The harmful fungi may be either bacteria or also hyphomycetes (moulds) and blight, smut or rust-causing fungi (Urédo, &c.).

It is the case here always of the reception of diseased, decomposed or "infected" vegetable nutritive matter. The disease causing moment is considered by Friedberger and Fröhner to be partly the invasion of the respective micro-organisms (fungi), partly the toxin formed by them in the "infected" vegetable foodstuffs. The chief, effect would in the majority of cases appear to be due to the toxin especially as many of these micro-organisms, as saprophytes, are unable to grow in the living animal body. As in the case of the meat-poisonings, the case is here also frequently one of intoxications in mass, a circumstance which as already mentioned is exceptionally fitted for simulating an infectious disease, especially when, as is often the case, the previous history is deficient, and the clinical symptoms little characterised.

Enzymes.—We can, however, also conceive intoxications which demand a special interest on account of their ætiology—these are intoxications with substances which, while they do not intrinsically possess a high toxicity, are yet able, even in the minutest quantities, to chemically alter extraordinarily large quantities of certain substances without themselves suffering decomposition. Substances with this quality are known in chemistry as catalytic or catalysing.

After giving a very elaborate description of enzymes, their origin and actions, and the analogy which they manifest to toxins, he says:—

If we call to mind that enzymes in the minutest quantity are able to convert an enormous quantity of substance, and thus by the transfer of a minute quantity of active enzymes illness could be produced, it follows that intoxications with suitable enzymes, acting specifically on living body-substance, and which one might designate as "pathogenous," could easily simulate real infectious diseases.

Infection and intoxication, and how to experimentally distinguish them in doubtful cases.—Two ways are open, the biological-chemical experiment and the experiment on the animal. For the study of the biological-chemical properties of bacteria, we adopt their artificial culture in certain fluid nutritive media. In the case of those merbific agents which we cannot cultivate artificially, we are restricted to natural culture in the susceptible animal.

Of physical influences which act on bacteria are high and low temperatures, light and exsiccation. The chemical means by antiseptics or disinfectants. The large majority of these means act as general protoplasm poisons, exercising their injurious effect on all living protoplasm.

After showing that some of these physical and chemical agents act similarly on toxins and enzymes as they do on bacteria, he says:—"We require for the proof of the existence or non-existence of absolutely unknown living micro-organisms a general reaction

pertaining to life, and one moreover that is exclusively confined to living substances.

In the "power of reduction" of living organisms, an exceedingly characteristic reaction for living substance of all kinds (micro-organisms, body-cells living isolated, etc.) appears to be furnished, which should fully satisfy all the demands before-mentioned.

The "power of reduction" is an ability of the living protoplasm. It is a result of metabolism and therefore of the need of oxygen of the living substance. Processes of reduction must occur wherever living micro-organisms are found in a medium which contains reducible substances. They must occur therefore as well in the living infected organism as in the artificial culture. Labbé has shown that bacteria act reducingly in the infected animal body. (The blood-colouring matter here forms the indicator of the process of reduction.)

The processes of reduction must take place even if the respective micro-organisms are *aërobia* and the oxygen of the air is at their disposal; for even these micro-organisms require in addition to the free oxygen taken out of the air to consume O-containing groups of atoms of the nutritive material.* Also the oxygen of the air will always have too little access to the lower strata of a micro-organism-containing medium, to be able to suffice for the strong O-requirement of the micro-organisms. We can artificially force the *aërobian* micro-organisms to a stronger development of the reducing action, if we temporarily cut off the supply of the oxygen of the air by a suitable arrangement of the experiment. As the reductive action of living organisms is not discernible to the senses in the common sub-strata, we must add to the latter substances, which, while easily reducible and harmless for living protoplasm, show their reduction by a change of colour. Such substances exist, as Ehrlich first showed, in numerous natural and artificial colours. For a demonstration of the action of reduction we usually employ the colouring matter of lithmus or methylene-blue, but especially the latter, as it possesses the properties required in the foregoing remarks in a full measure. The reduced methylene-blue (Leuko-methylene-blue) is colourless. If we therefore bring a thin solution of this colouring substance into contact with living cells or bacteria, it is deprived of colour in a comparatively short time. The reaction does not take place as soon as the respective micro-organisms are killed. In true recognition of the importance of this colour-reaction for experimental biology, M.M. Neisser and Wechsberg have developed it into a method of "bioscopy."

According to the two investigators named the reaction is most simply carried out as follows:—About 2 ccm. of a (not too strongly diluted†) mixture of bacteria with a physiological solution of common

* The *anaërobia* supply their total requirement of oxygen by consumption of O-containing atom-groups of the nutritive material. They therefore develop especially energetic reducing effect.

† For in the presence of only a few bacteria-individuals the reduction can of course be only incomplete, or take place only after longer time.

salt are put into a small test-tube and then 2 drops of a methylene-blue solution strongly diluted with physiological solution of common salt are added, so that the liquid assumes a distinctly blue colouring. Then a layer of paraffinum liquidum is superposed (to prevent the re-oxydation of the reduced methylene-blue by the oxygen of the air*) and the tube is put for two hours into a thermostat (37°). On expiration of this time the liquid in the tube, provided we were dealing with living cells or organisms, appears absolutely colourless.

Contrary to this action of living organisms, a number of ferments, as well as several toxins, as the investigators named observed, brought about no reduction of the methylene-blue under like experimental conditions. As we deal here with a reaction which is peculiar to all living beings, as, moreover, just those substances which might be able under certain circumstances to cause similar diseases, as the pathogenic micro-organisms, do not show the reaction, it appears that we are provided with an exceedingly valuable adjuvant in the method of "Bioscopy" for "recognising living organisms which give so far to our observation no other clue than this power of reduction of theirs." (MM. Neisser and Wechsberg.)

Reference is then made to MM. Nocard and Roux's method of cultivating the microbe of bovine pleuro-pneumonia by filling their sterilized collodium capsules with suitable nutrient matter after the latter had been infected with the virus, then close them, and insert them into the abdominal cavity of a susceptible animal. The thin collodium membrane permits the diffusion of the fluids of the experimental animal's body into the nutrient fluid, but prevents the access of the micro-organs and protects them against the attacks of phagocytes.

After referring to the requirements necessary to be observed in order to obtain a pure culture of a microbe, and to avoid the mistakes which are so common in attributing various forms of bacteria as the causal agent of a particular disease, he says: "It is quite possible that an additional unknown infectious microbe should grow and multiply in the cultures *in company with the causal bacterium, which is in an invisible form,*" and instances the case of the rabid virus which was associated with a bacterium from which it apparently could not be separated. Hence by the inoculation of a culture of this bacterium rabies could always be produced. At last, however, after much trouble the bacterium was separated from the rabid virus.

The circumstances which prevent the microscopic recognition of morbid agents are then dealt with.

* According to MM. Neisser and Wechsberg. The superposition of a layer of paraffinum liquidum seems, in my opinion, even to directly promote the taking place of the reaction, in that on the one hand the Aërobia are deprived of the free oxygen of the air, and they are thus forced into more energetic reducing action, and on the other hand the anaërobia, for whom the free oxygen is a poison, are protected against this poison.

1. The micro-parasites may possess the necessary size to be microscopically perceived, but for other reasons they have not been correctly recognized.

2. Or the micro-parasite may be of such minuteness as to be beyond the bounds of visibility.

3. It is further possible that parasitic micro-organisms cannot be recognized because they fail to reach to the micro-chemical colouring re-agents. We must assume that all bacteria possess affinity for basic aniline colours, and that a failure of the coloration is always founded on special physical conditions of the structure of the respective kind of bacteria.

For the definition of the authors of many infectious diseases it is important to know the habitat of the former in the body. As a rule we look for the morbid agents in the diseased parts, in the disease-products, or in the case of general infections in the humours of the body and the internal organs of the diseased individual. Not rarely, however, it happens that we find the morbid agents, even in the case of diseases whose ætiology has been completely cleared up, neither in the blood nor in the pathologically changed tissue, either because they have vanished from the former or because they have died and become decomposed in the latter. Something similar could also be conceivable in the case of certain infectious diseases not yet ætiologically explained. It is also possible that the morbid agents are present in such small numbers that they for this reason elude easily the microscopic demonstration (*e.g.*, bacteria which in the main act purely toxically).

Finally, it is necessary to take into account the possibility that the infectious disease to be investigated is not originated by a single microbe but that it owes its origin to at least two micro-organisms; not a case of simple infection but of mixed infection. (1) Both kinds may each be singly pathogenic, but in a different sense to that in which they act together. (2) One kind is pathogenic and the other not. (3) Neither kind is pathogenic by itself. No. 2 may be the case in tetanus and other infective diseases caused by *anxrobia*, whose morbid agents appear to require the admixture of other bacteria to become effectual (Kruse).

D.H.

MALIGNANT JAUNDICE OF THE DOG.

(Continued from page 50)

PATHOLOGICAL ANATOMY.

"The longer the disease has lasted so much the more pronounced are the lesions. Often the corpse is icteric; the yellow colour, more or less intense, may attain to a chrome-yellow.

"The spleen is often hypertrophied; it possesses sometimes 3 or 4 times the normal size and it then extends along the hypochondrium as far as the breast-bone. Its colour is darker and reddens on contact with the air; its consistency diminishes without going as far as softening; in the rapid forms, these modifications are absent; on the other hand the preparations obtained by rubbing are very rich in hæmatozoa.

"The liver, ordinarily gorged with blood, is little modified in appearance; it sometimes has the semblance of the cardiac liver; the blood which wells from one section is always heavily charged with parasitic globules. The biliary vesicle, generally distended, contains a thick bile, syrupy or clotty, of a deep green colour.

"The digestive mucous membrane is seldom infiltrated and congested at the level of the duodenum.

"The kidneys are most often congested at the extremity; the capsule is easily detached, exposing to view a large number of petechial stains of varying dimensions; on section, the bed of the cortex appears gorged with blood and covered with a fine hæmorrhagic "piqueté." The blood which flows from it is extremely rich in parasites.

"The lungs are often studded with small apoplectic foci; in very young animals which succumb so rapidly, it is almost the rule to observe acute oedema of the lung, with copious and slightly reddish frothiness in the bronchial tubes and the trachea.

"The pericardium contains a little blood or lemon-coloured serosity; it is not rare to see numerous petechial stains towards the point of the heart or beneath the left endocardium of the heart.

"The lymphatic glands are seldom impaired.

"The bone-marrow is almost always the seat of a severe congestion which gives it the foetal appearance; it is soft, friable, and contains a large number of parasitic globules.

"The nervous centres present nothing remarkable, except a little congestion of the meninges.

"At the autopsy all the modifications of the blood on which we have already dwelt are met with again; the heart and the large vessels contain blood-clots of little consistency, formed almost entirely of fibrin, weltering in a reddish serum heavily charged with hæmoglobin.

"The histological study of the organs demonstrates that all these lesions proceed from the extreme distention of the capillary network by masses of globules, the majority of which are gorged with parasites.

VIRULENT PRODUCTS—METHODS OF INOCULATION—INCUBATION—
RESISTANCE OF THE VIRUS.

"The parasite exists in the blood; all the vascular tissues can therefore communicate the disease. We have made special use of the blood in our researches; subcutaneous, intramuscular or intravenous inoculation communicates the disease in either form, provided that the blood injected contains parasites; intravenous inoculation is the most rapid and the surest method.

"The richer the blood injected is in parasites and the younger the dog inoculated, the more severe also will be the disease produced and the more rapid will be its evolution.

"In the case of puppies, a drop of rich blood is sufficient to convey the infection fatally; in order to render full-grown dogs sick they must be inoculated with one cubic centimetre.

"In the slow form of the disease, the blood is much less virulent than in the acute form, putting aside the quantity of parasites which it contains; when injected even in a large dose, it generally communicates only a mild type of disease. In one of our series of experiments, the initial virus came from a dog on the road to recovery, whose blood still contained parasites; all the dogs of this series have had the mild form of the disease; not one has died.

"Whatever may be the quantity of blood injected, its richness in parasites and the method of injection, a certain time always elapses before the appearance of the first symptoms; if the blood of the general circulation is systematically examined, parasitic globules are hardly ever visible before the 36th hour; as a general rule, it is only after two full days that the parasites appear, even in a case of intravenous inoculation. If intramuscular or subcutaneous inoculation has been resorted to, incubation lasts from five to six days. In the acute cases death supervenes on the average three days after the appearance of the parasites; puppies die still more quickly, 36 to 40 hours after. If then intravenous inoculation has been employed, the animal dies, in general, on the fourth or the fifth day; if it has been inoculated subcutaneously, it may survive 9, 10 or 11 days. When the disease that has been evoked assumes the slow form, its duration varies considerably; the animal may remain sick 30, 40 and up to 60 days.

"Blood which has been collected cleanly and kept in the cellar and sheltered from the light is still virulent after 25 days in winter; in summer, we have found it inactive after 14 days.

"The blood loses its virulence when heated to 50°C for half an hour, to 45° for an hour, to 44° for an hour and a quarter; it is still virulent after an hour and a half's heating to 43°C.

ÆTIOLOGY.

"Nothing is more firmly established than the part which the tick plays in the development of bovine pyroplasmosis. The splendid experimental researches of Smith and Kilborne, confirmed by those of Pound, of Koch and Lignières, have demonstrated that, in order to induce Texas fever, Tick fever, Redwater or "la Tristeza," it is sufficient to place on the surface of the bodies of the adult bovines, which have come from non-infected countries, the larvæ born of ticks (*Rhipicephalus annulatus*) which have lived on diseased bovines. Since then, everywhere where the same disease has been observed (and its geographical area is immense) it has been possible to establish a close relation of cause to effect between the appearance of the hæmoglobinuria and the presence of ticks on the skin of the sick animals.

"The great analogy which exists between the symptoms of pyroplasmosis, whether the dog or the ox is concerned, and especially the approximate identity of the hæmatozoön in the two species, necessarily made us think of an ætiology of the same nature.

"In all the observations collected at Alfort the sick dogs had been recently covered with ticks; some still carried them. All those ticks which have passed through our hands belonged to the species *Dermacentor reticulatus*.

"It is quite probable that this species is the ordinary agent of transmission of the disease, at least in France.* We cannot, however, affirm it, for we have not succeeded in infecting dogs by covering them with larvæ obtained from female ticks gathered on our sick animals.†

"In almost all known cases, sporting dogs which had recently hunted over wooded or bushy country or which had inhabited kennels infested with ticks were concerned.

"Contrary to what is observed in bovine pyroplasmosis, quite young dogs (from two to 12 weeks) are much more easily infected than the adults, and, with them, the disease assumes a very acute form, always fatal.

"*Specific nature of the parasite.*—Morphologically, the hæmatozoön of the dog is identical with that of the ox. Nevertheless, it can only

* Pyroplasmosis in the dog in South Africa (malignant jaundice) seems due to a different ixodes, which Prof. Neumann of Toulouse has identified as *Hæmaphysalis leachi* Audouin.

† The very interesting article by Lounsbury furnishes the explanation of our repeated failures; while the larvæ of the *Rhipicephalus annulatus* can accomplish their entire evolution on the same bovide, those of the *Hæmaphysalis leachi* abandon the dog which entertained them provisionally on the eve of each metamorphosis (i.e. moulting, sloughing or casting of skin); the metamorphosis completed on the ground or litter, the nymph and the adult tick must find a new host, in order to prepare themselves either for the next metamorphosis or for laying further; it seems that neither the larvæ nor the nymphs have the power to communicate the disease; the adult ticks alone would be really pathogenic.

It is probable that the *Dermacentor reticulatus* behaves just like the *Hæmaphysalis*; for after having seen the larvæ placed on the skin of our dogs under experiment grow little by little, we saw them suddenly disappear before passing into the state of nymph, and they vanished into the litter.

develop in the organism of the dog. It has been impossible for us to convey the disease, or even to ascertain the existence of the parasite in the globules of an animal of another species, whatever were the methods of inoculation employed (subcutaneous, intramuscular, intravenous), the quantity of the blood injected and its richness in parasites; ox, horse, sheep, goat, cat, rabbit, cobaya, white rat, white mouse, fowl and pigeon have shown themselves completely refractory.

ATTEMPTS AT PARASITE-CULTURE.

"All our attempts at artificial culture of the hæmatozoön of the dog have remained fruitless.

"Defibrinated dog's blood, serum heavily charged with hæmoglobin, blood rendered incoagulable by the injection of leach extract into the vessels of a lean dog have given no better results than the customary mediums.

"If some defibrinated blood very rich in parasites is placed by the stove at 37°C, an intense phagocytosis of the infected globules is sometimes observed; the parasites also are seen to undergo profound changes; they are never seen to multiply themselves. Whatever may be their form in the beginning, they rapidly become globulous and rounded; their nucleus becomes central; then, by a kind of condensation or contraction of the protoplasm, they diminish in size to the extent of soon appearing reduced to the nucleus.

"The same transformations take place also in blood preserved in the temperature of the room; but they occur much more slowly, in such wise that it is possible to follow exactly all their phases. After five to six days, the parasites have already considerably diminished in size and seem reduced to the nucleus, which is surrounded by a thin bed of protoplasm scarcely coloured a very pale blue, whilst the nucleus is coloured a deep carmine.

"After a few weeks, the red blood corpuscles are considerably altered; they seem to have lost the major portion of their hæmoglobin, they take the colouring matters very badly and their outline is hardly distinguished; often indeed it seems that they are soldered to each other so as to constitute a homogeneous surface, uniformly coloured a very pale orange, in the midst of which the parasites, coloured a deep red and reduced to their nucleus, which is aureoled with a very thin bed of scarcely visible protoplasm, are disseminated in large numbers and may furnish the illusion of a culture.

"We have caused the blood of sick dogs—a blood very rich in parasites—to be sucked by leeches; the leeches being kept near the stove at 22°C in water renewed daily have enabled us to examine day by day the modifications which take place in the blood thus collected; nothing in addition to what we have described above is observed. After fifteen hours, the parasites, always bulky in size, have already assumed the globular shape; but they seem to have lost all amoeboid motion; the red globules are pale and tend to become agglutinated; during the days following the parasites are seen to decrease gradually

in size; at the end of a week they seem reduced to their nucleus and are disseminated in a kind of shapeless substance resulting from the agglutination and the fusion of the red globules; their number has not increased; these alterations persist the same until the death of the leech, which occurs from the fifteenth to the twentieth day.

"It plainly seems, therefore, that the hæmatozoön can only multiply itself in an animate and appropriate centre.

IMMUNITY FOLLOWING ON RECOVERY.

"Every dog which has recovered from the disease, whether communicated by nature or induced by experiment, is henceforth refractory; it sustains with impunity the injection of virulent blood in doses much larger than those which are invariably fatal to the control animals."

Here follows an account of a series of inoculation experiments in proof of this statement, which concludes by stating that the immunity conferred by a first attack followed by recovery is at the same time real and permanent.

WHAT IS THE MECHANICAL CAUSE OF THE IMMUNITY?

"We have already stated that in the blood of the sick animals, especially of those which are on the road to recovery, an active phagocytosis is produced. It is common to observe large mononuclear corpuscles which have absorbed 2, 3, 4 and up to 6 red globules, all of them infected; of these globules, some have already lost all their hæmoglobin; others are coloured almost as well as the normal globules; between these two extremes, all the intermediate stages can be seen; the former have their parasites rounded, very small, scarcely coloured, with an ill-defined contour; in the others, the parasites, likewise small and round, are strongly tinged and their contour is clearly prominent.

"This phagocytosis operates equally in the depth of the organs; it is observed to be very active on the sections of the spleen, even in dogs which have succumbed to the acute form of the disease. Everywhere mononuclear corpuscles can be seen stuffed with parasitic globules in process of digestion; sometimes the phagocytosed globules are so numerous that the phagocytes give the illusion of a capillary which has been severed across.

"The infected blood corpuscles are invariably absorbed by the mononuclear; we have never seen a single globule phagocytosed by a polynuclear; it is nevertheless probable that the polynuclei also contribute to the defence by absorbing the free parasites in the plasma; but we have not established the fact definitely.

BACTERICIDAL ACTION OF THE SERUM OF IMMUNISED ANIMALS.

"When one quantity of virulent blood is mixed *in vitro* with three, four or five quantities of serum from a dog which has recovered from the disease, the mixture can be injected with impunity into clean

dogs, even intravenously. These dogs remain in good health and, at no moment, does their blood contain parasites."

But these dogs are not rendered refractory to the disease, and even when the serum is injected at one point and the blood at another, the inoculated dog takes the disease quite as readily as the control, even when the serum is injected 12 or 24 hours before the virulent blood.

The microbicidal action of the serum is, however, observed to be much more pronounced when the dogs have been highly immunised by repeated injections of virulent blood. The serum of a dog which has recovered from the disease loses its action when heated for half an hour to 56—57° Cent., while the serum obtained from a highly fortified dog preserves its microbicidal action after being heated to 56—57° Cent. for one hour.

Further, the bacteriological action of the serum is plainly due to the refractory condition of the dog, as the serum of healthy dogs do not possess it.

The serum of other animals, such as the sheep and goat, which are refractory to this disease, also possesses bactericidal action, after the animals have been subjected to repeated injections of virulent blood; but not to the same degree as the serum of dogs which have been similarly fortified. An account is given of a long series of experiments which were conducted in order to establish these points.

PREVENTIVE ACTION OF THE SERUM OF IMMUNISED DOGS.

"We have shown in the foregoing paragraph that the serum of dogs which have recovered is incapable, by the injection of small doses, of preventing or retarding to any considerable degree the fatal effects of the test inoculation. The following experiments demonstrate that, when injected in larger doses, the same serum can considerably retard or even hinder the fatal action of the virus inoculated 24 or 48 hours after.

But the preventive action of the serum is much more definite if it comes from dogs hyperimmunised by means of large quantities of virulent blood.

"From these experiments the following conclusions may be drawn:—

(1) The serum of dogs which have recovered possesses a definitely preventive action, but this action is weak; in order to make it evident, strong doses of serum must be injected; 10 c.c. are not sufficient to prevent death; a noticeable delay only is observed in the evolution of the disease. Only one of the animals subjected to experiment has resisted after the injection of the serum of a recovered dog, but it had received 13½ c.c. of serum, an enormous dose for a small dog 15 days old.

(2) If the immunity of dogs which have recovered is strengthened by repeated injections of virulent blood, serums are obtained whose preventive action exerts itself in much smaller doses; all the dogs of the second series have resisted, after having received 5 c.c. and even

3 c.c. of serum, the inoculation with virulent blood which killed the control in six days.

"Again, too strong a dose of virus must not be injected. In our third series, all the subjects had received 3 c.c. of the same serum. They have all three succumbed—after considerably retarding the climax—to the test inoculation; but they had been inoculated with ten drops of a virus of which a dose of one drop kills the control dogs of the same age.

(3) The serum preserves its preventive action when it has been heated for half an hour to 56° — 57°C .

"Immunity can therefore be conferred against inoculation with virulent blood, which is always fatal to the control animals. But the immunity bestowed by the serum is of short duration.

"The four dogs of our second series had resisted the injection of the virus when performed 24 hours after the injection of the serum; they have been re-inoculated 11, 19 and 35 days afterwards; all have had hæmatozoa in small numbers; two have preserved all the appearances of health; the other two have been very sick. One of them, however, recovered; the other died, and, curious to relate, it is the one which had received the strongest dose of serum and which had been reinoculated soonest (on the eleventh day). It is true that this second inoculation was very severe; ten drops were injected of a virus of which a dose of one drop proved fatal to clean dogs of that age.

"The preventive action of a given serum exerts itself in a much smaller dose when the serum is mixed with the virulent blood before the inoculation is performed. The serum should be previously heated to 57° , so as to deprive it of its microbicidal action.

"Identical results are obtained when, after the action of the serum upon the parasitic globules, they are isolated by repeated "whippings" after washing in physiological water.

"It seems therefore that on contact with the serum of hyperimmunised dogs, the parasitic globules energetically attract the sensitive substance of the serum which delivers them undefended over to the action of the phagocytes.

CURATIVE ACTION OF THE SERUM OF HYPERIMMUNISED DOGS.

"The serum of dogs whose immunity has been strengthened by repeated injections of virulent blood is not only capable of exercising its preventive action when it is injected before performing the inoculation with virulent blood. It can also prevent death when it is injected in a strong dose 24 hours and even 42 hours after the inoculation with virulent blood which kills the controls in five days. *It has no power to retard death when it is injected only after the appearance of the parasites.*

ATTEMPTS AT IMMUNISATION BY THE INJECTION OF OLD OR HEATED BLOOD.

"*Old Blood.*—We have previously stated that virulent blood,

when collected cleanly and kept in the cellar screened from the light, remains virulent for a variable period, from 14 to 25 days according to the season."

But although this blood, after a given time, becomes incapable of communicating the disease to animals, it does not give an immunity even when injected in large doses.

Further, although a moderate heat kills the parasite, experiments have shown that the attenuation of the virus by heating, if not impossible, is at least very difficult to effect. Virulent blood when heated to 45° Cent, the heating, even when prolonged for a period exceeding one hour, does not appear to exercise any influence on the vitality and virulence of the parasite; but the longer the heating is protracted, so much the more slowly does death supervene. Not one of the dogs which withstood the injection of the heated blood have subsequently resisted the test inoculation.

Return of Fruit Exported

DURING THE MONTH OF MAY, 1902.

Port.	Variety of Fruit.	No. of Packages.	Quantity.	Declared value.		
Cape Town.				l	s.	d.
	Naartjes ...	1,424	28,050	319	0	0
	Oranges ...	...	560	4	10	0
	Lemons ...	12	500	4	0	0
	Total ...	1,436	29,110	327	10	0

CYANIDE GAS FUMIGATION.

PROPORTIONS OF THE CHEMICALS.

(BY CHAS. P. LOUNSBURY, Govt. Entomologist.)

A number of interested persons have of late asked for an explanation of the difference between the proportions of the chemicals for hydrocyanic acid gas generation and the quantities to use recommended in the Departmental publications and those published in the flood of American and Australian literature that reaches them. The fumigation table and an explanation of it, was given in a pamphlet entitled "Cyanide Gas Remedy for Scale Insects" issued by the Department in January last, and a copy of this may be had for the asking. Briefly it follows the old Californian recommendations as to the proportions; and the quantities are those which seem correct from South African experience with the kind of covers in use here.

The quantities recommended vary from the proportion of an ounce of cyanide for about one hundred cubic feet in the case of very small trees to an ounce for about three hundred feet in the case of large trees. The gas is made stronger for the small trees because the loss by leakage through the covers, absorption by the soil, and in other ways is found to be very great in their case in comparison with that of large trees. A dome cover fully expanded over a tree four feet high by three in diameter encloses many times the area of soil and has far greater surface in proportion to the cubic contents of the space encompassed than has a dome cover fully expanded over a tree twenty feet high by fifteen wide; consequently, it is necessary to make allowance in calculating the dose of chemicals for the greater relative loss by the unavoidable diffusion of the gas through the cover and into the soil. This leakage was at first ignored—as many others are still ignoring it—and charges of chemicals were used proportional to the cubic contents; but it was soon found that the treatment of small trees was not so uniformly successful as was the treatment of large ones. Under covers made gas-tight by several coats of oil or paint it is unnecessary to vary the strength so much, but some allowance still should be made for the greater loss into the soil as the size decreases. Some American writers advocate the use of one ounce to one hundred or three hundred cubic feet where in this Colony we use one ounce to two hundred or three hundred cubic feet, but their recommendation applies to the winter treatment of deciduous trees in their cold climate and not to the treatment of citrous trees at all.

It is a natural weakness in many men to do and to teach a thing a little differently than the man from whom they learned, even though

the change bring no advantage whatever; and it is only the fact of this common trait in the human character that offers any explanation of the confusing variations in the proportions of the ingredients for cyanide gas generation which various writers have propounded, and also for the statement by many of the weight of cyanide in so many "grammes" per cubic foot instead of in the equivalent number of ounces. If the metrical system of weights and measures were uniformly used in their recommendations, no criticism would be here offered; but to associate grammes with fluid ounces and cubic feet in publications intended for popular instruction can hardly be justified. The statement "one ounce of cyanide to one hundred cubic feet" is surely much easier for one to comprehend than that of "twenty-eight grammes per cubic foot" which is the equivalent expression in the language of many recent writers on fumigation. As for the proportions of the three ingredients, it will be found that the old Californian proportion, of one ounce by weight of cyanide to one ounce by measure of sulphuric acid and two ounces of water, meets the conditions satisfactorily, and therefore I have adhered to it and shall continue to recommend it. No other proportion that has been suggested is so simple or admits of such easy calculation.

The sulphuric acid is used to break down the compound of potash and cyanogen that is known as "cyanide," so that the cyanogen is given off as a gas in combination with hydrogen, that is as "hydrocyanic acid gas." Theoretically a fluid ounce of the acid to a weight ounce of cyanide is more than double as much as is actually necessary to cause the desired chemical changes, but a large excess of the acid is needed to hasten the reaction, to make certain of its completion, and because the ordinary commercial article falls several per cent. short of purity. The excess we use, however, is ample, and there is absolutely no need for fumigators to fret and fear that they are not using enough because writers in distant lands advise the use of one and one-fourth, one and one-third, one and one-half, or two fluid ounces with one ounce of cyanide. Acid costs too much in South Africa for it to be wasted.

Water is necessary to dissolve the cyanide that the acid may act upon it, and to furnish in its fresh combination with the acid the degree of heat essential to bring the chemical changes about quickly. Within rather wide limits there is little material difference, so far as practical results are concerned, whether little or much water is used. Prudence, however, dictates the use of a constant ratio in order that neither too much nor too little be ever taken, and in practice two parts of water to one of acid has been found a reliable and a convenient proportion. If less water is used, say part for part with acid, the reaction is apt to be slow and a somewhat undesirable crystalline bye-product is at once formed; if much more water is used, say over four parts with one of acid, the reaction may in part fail through lack of heat to complete it, particularly when the quantities of the chemicals are small. A large bulk of water is also disadvantageous because the generating vessel must needs be unnecessarily large and

because there is a greater loss of gas through absorption into the liquid.

The element of heat is an important factor in generating the gas. Theoretically, the chemists assert that about equal volumes of acid and water give the maximum heat, and all excess of water detracts from the temperature reached. To enlighten myself on this matter I once made some rough but practical tests, mixing acid and water in various proportions and observing the temperatures indicated on a thermometer plunged into the fresh mixtures. The acid and water before mixing registered about 70°F., and the mixing was performed in an ordinary heavy measure glass. Enough acid and water to make the aggregate amount about five ounces was used in each case.

Four parts of water to one part of acid gave	176°F
Three " " " " "	203°F
Two " " " " "	230°F
One " " " " "	275°
Two-thirds of a part " " "	280°
One-half " " " "	266°
One-third " " " "	244°
One-fourth " " " "	221°

The boiling point of water is 212° F., and it will probably surprise many of my readers (as it did me) to learn that this temperature is far exceeded when acid and water is mixed in ordinary proportions for fumigation. The results indicate that it is really better to add less water than it is customary to use, if the proportion is to be varied, rather than more water. The temperature falls very rapidly after the mixture is made.

In some particulars the instructions of a number of oversea writers are misleading. Errors have been made in framing several of the "fumigation tables" and in the directions for computing the spaces encompassed by covers. Then it is common to read that the acid should be slowly stirred into the water, when as a matter of fact the two liquids mix as they are poured together, making stirring a waste of time aside from increasing the risk of getting spots of acid on to the cloth. Quite as frequently the mistake is made of stating that the water should be poured into the acid, a procedure liable to cause the mixture to splash and damage something or somebody. Altogether I would advise colonial fumigators to follow the directions given in the Departmental publications to the exclusion of outside recommendations. If any errors are discovered in the instructions, or if these instructions are not sufficiently clear in any respect, let this office know and the necessary corrections or explanations will be made without delay. Similarly if any good new ideas on the subject are found in publications from anywhere else in this broad world, we would be glad to learn of them that we may consider their adoption.

THE TOGGENBURG GOAT.



IMPORTED TOGGENBURG GOAT, DESDEMONA

Since the introduction of the Toggenburg goat into the Colony, a good deal of interest is being taken by goat breeders and others respecting its milking qualities and other features. In order, therefore, to afford some information about it, we quote almost *verbatim* from a capital little work on milch goats* which should be in the hands of everyone who takes an interest in goats.

Of the Swiss goats introduced into England at different times, the author considers the Toggenburger the most valuable, and it has now become fairly common and well established. Professor Anderegg, Secretary of the Swiss Agricultural Society, says in his treatise concerning this particular breed:—"This is one of the most valuable of Swiss goats; she is easily acclimatised, and will thrive as well in the stable as on the hills."

These goats are described as always somewhat lean and bony-looking when in profit, but like the Jersey cattle, they seem to throw all the strength of their constitution into the production of milk. They have a remarkable power of transmitting their characteristics to their offspring, many half-bred animals showing all the distinguishing characteristics of the race. Owing to the well-known liability of

* *Milch Goats and their Management*, by Bryan Hook. Illustrated, pp 1 -115. Vinton & Co., Ltd, 9, New Bridge St., London, E C, 1896. 3s 6d

cross-bred animals to revert to an earlier and inferior type, Swiss breeders are very careful to preserve the varieties distinct. Professor Anderegg states, moreover, that the disadvantage of cross-breeding in goats has been conclusively demonstrated by experiment. With this end in view, the authorities annually send an inspector to all the larger villages, who allots a subsidy to the owners of all the stud goats that come up to a required standard of excellence, the sum being varied in accordance with the claims of each animal.

The milking power of the Toggenburg breed is the result of the conditions of life under which it has been developed through a considerable period. The population of the district is largely supported by the proceeds of the Swiss embroidery industry, and the goats are mostly owned in twos and threes by the weavers, for the household milk supply.

Thus the best milkers have been preserved, and kids from them reared to replace the natural losses from old age, and by this means the general milking qualities of the race have been advanced as compared with the goats of cantons or countries where these animals are kept in vast herds, principally for the sake of their flesh.

Any Toggenburg goat that showed inferiority at the milk pail would be very soon converted into mutton, and so would have no chance of transmitting defects. Such a process of selection must naturally produce results in time, for it is probable that the Toggenburg Valley had the same breed of goats in the days when its men there fought so gallantly for religious freedom. The value of characteristics that have been so firmly impressed upon the race must be obvious, and also the importance of preserving a pure strain from which to make crosses.

Of the many hundreds of Toggenburgers seen by Mr. Hook in their native valley, he says not one but would have attracted the attention of a fancier as an animal of remarkable milking qualities. On the other hand he has known animals bred from first-rate British or mixed stock, that have stood well at shows, but were nevertheless unable to supply milk enough for their kids. The general appearance of the Toggenburg goat, continues the author, is attractive and striking; the colour is a peculiar shade of brown or mouse colour, and with white markings distributed with perfect regularity. The legs, below the knees and hocks, should be white, and a white streak runs down either side of the face and round the ears. The head is without horns, the ears are pricked and of moderate size, as is the case with all the Swiss varieties, and the face bears a remarkably intelligent, gentle expression. Amongst the adult goats not more than one in every hundred carries horns. The coat of this goat is often shaggy and rough. The illustration accompanying this account is taken from Mr. Hook's practical little book. This animal was imported by him from Switzerland.

QUALITY IN MOHAIR.

In the *Agricultural Journal* of June 19 an article was reproduced from the *Midland News* giving a most interesting report on sample fleeces of Cape mohair by Mr. S. B. Hollings of Bradford. The criticism offered was so keen and transparently inspired by a desire to assist the Angora breeders of the Colony that it was bound to attract widespread attention.

Mr. C. Lee, sen., the noted Angora breeder, has since contributed to the same journal a reply which we reproduce in order to give the answer the same prominence as the original criticism.

Mr. Lee writes as follows :—

Sir,—With your kind permission I should like to make a few remarks upon what Mr. Hollings has said in his letter on this subject, as contained in your issue of the 24th ult. But before doing so I should like to say we owe him a debt of gratitude for the trouble he has taken to supply us with information regarding the position our mohair holds in London markets in comparison with Turkish hair. Naturally it would have pleased us better to have learned that our mohair compared favourably with the Turkish, but seeing that it does not (and I myself am perfectly satisfied it does not) Mr. Hollings has done us a kindness by telling us the whole truth and nothing but the truth.

The nine sample fleeces he referred to are mine, and were sent by the Chamber of Commerce for examination and report. The six fleeces were from full-grown ewes, and rather aged, and the other three from kids. You will have noticed that while the manufacturers considered the six fleeces were good in many other respects, the fibre was considered what they term too strong, and the three kids, while also good in many other respects, were short in staple. Now, I made a point of sending the strong fleeces. Their average weight was 6lb., and the average age of the goats from which they were taken was six teeth. Had I sent fleeces from goats of two teeth, of course the report would have been more favourable. Manufacturers, of course, make no allowance for the age of a goat from which the fleece is taken, neither could they be expected to do so. As you will see by reading the report, the only exception to the three kid's fleeces particularly was that they were wanting in length. Now I explained in my accompanying letter that they were shorn six weeks before the usual time owing to the prevalence of grass seed. Of course they made no allowance for that, but merely expressed their opinion upon what they had before them, and one could not expect more. The report upon the lot I consider was fair and honest and is of considerable service to me. I may as well say that I asked to have the yolk that was found in the hair carefully analyzed and reported on, but the reply was "there was no objectionable matter found in the fleeces," or words to that effect, so there was no necessity for analysis.

Mr. Hollings is quite right in saying "it is quality" that the trade requires and not these big, strong fleeces," and as you put it, "there is the missing link." I have felt this for a long time, and while avoiding the oily goats because they so soon run strong, I must confess I have been unwilling to give up weight. All of the six fleeces I sent to Bradford weighed over 8lbs., but it is now clear to me that to produce what the trade requires we shall have to be satisfied with lighter fleeces.

For the last three years I have paid more attention to fineness at the cost of weight, so that my last clip showed a falling off of about 8ozs. per fleece, averaging about 4lbs. 8ozs. Even this I find will have to be reduced to get what the trade requires.

I have just shorn my young rams, and have kept five fleeces for exhibition. These weigh from 5lb. to 6lb. 4ozs. One of them I should like to send you for general inspection, and shall be glad if you will kindly receive it for that purpose; this one I consider the best of the five. I know there are those who will say "give me the goat that clips 5lb. and you may keep the one that cuts 3 or 4lb., for I make more out of mine at 9d. per lb. than you do for your 1s. Well, at first sight there is some show of reason in that, but when the matter is fairly looked into, we soon find which will pay the best. It is well known that the heavy fleeced oily goat always grows coarser and shorter in staple as it grows older, while the fine Angora retains its fineness as long as it lives, so that the hair from an oily goat of 2 or 4 teeth that would fetch 9d. per lb., when it has 6 or 8 teeth would fetch a good deal less. It may be argued, too, that the trade may change and a greater demand spring up for stronger hair, which means heavy fleeces, but even in that case, which is not very likely, the owner of the fine goats would have the advantage, because he could draft the coarser animals from his flock and with them use heavy fleeced rams, and so get what he wants in one season, whereas the man with the coarse bearing goats could not convert them into fine ones in less than from three to five years. It is a fact, too, that if the oily goat is not crossed now and then with the finer kind, generation after generation they become coarser and shorter in staple, and I don't hesitate in saying that the thanks of the country are due to those who have avoided the oily clips.

In this part some of the most illiterate and unobserving are enquiring for finer and lighter fleeced rams, because of the above mentioned facts. During last January and February I sold twice as many rams as at any season before, and I was a little surprised in reading an order which said "Send me three of the finest and lightest fleeced rams you have," and seeing that it came from one who had always used the oily and heaviest fleeced rams he could get, besides what I was told, this was evident proof that he had found out he was on the wrong lines.

Without going further into the facts and points which Mr. Hollings has produced, and some of them are very important indeed, I should like to notice the question which he asks: "Can a *via media* be

discovered which will bring to breeders a paying price and at the same time satisfy the need of manufacturers, thus removing the stigma that is at present attached to the Cape mohair?" Yes, I think it can; but as this letter is stretching out longer than I intended I shall reserve any further remarks for a future issue.

GRAFTED VINES—ARAMON-RUPESTRIS.

As I have recently received several complaints of vines grafted on Aramon-Rupestris, particularly our green grape, causing a certain amount of disappointment as to their bearing properties, and as there is a possibility of those individual experiences bringing this undoubtedly valuable graft-bearer into a certain amount of discredit, it appears desirable to offer a few explanatory remarks which may serve as a guide to farmers.

When one takes American vines up after a few years' cultivation a striking difference in regard to the development of the root system of the various kinds of American vines will at once be observed. Whilst the Riparias form a shallow, lateral system, consisting of a mass of fine roots, radiating in almost rectangular position from the original cutting, to which an astonishingly large number of rootlets are attached, the Rupestris varieties and their hybrids show stronger and thicker roots with the distinct tendency of penetrating to a greater depth into the subsoil, dividing at a later period into finer roots. Hence our experience that vines on Riparia make weaker and earlier bearing trees than the same varieties on Rupestris. For the fertility of any tree or plant, other conditions being equal, stands in inverse ratio to its vegetative powers.

In grafting vines on Aramon-Rupestris, we put them on the strongest and most vigorously growing American stock going in this country, and import by this operation to such vines a vitality hitherto unknown. This vitality is still increased by planting such vines on the rich fertile low-lying lands which is too often done, though we have for years and years advised against it.

Moreover, in time such vines will assume a normal condition and produce satisfactory crops, as is borne out by the local experience of the past seven years.

The point at issue, therefore, is to use Aramon-Rupestris grafted vines almost exclusively on the poorer and even the poorest lands, where this stock will thrive admirably. To farmers who already have planted vines on this American stock in rich land, my advice is to prune such vines for one or more seasons on the same lines as have been frequently recommended in regard to the cultivation of Cabernet Sauvignon.

C. MAYER.

WESTERN PROVINCE AGRICULTURAL SOCIETY.

THE ANNUAL MEETING.

The Annual General Meeting of the Western Province Agricultural Society was held on Saturday, July 26, at the Harbour Board Offices. Mr. Alfred Barry presided, and among those present were : Messrs. T. J. Louw, E. van Niekerk, W. H. Lategan, J. Malan, J. F. van der Spuy, E. Pillans, A. J. B. van Niekerk, J. A. van Breda, J. J. Kotze, F. Spilhaus, J. van Breda, J. W. J. Versfeld, G. H. Dunn, Fred. Ayers (acting secretary), Maynard Nash, E. Mellish, R. Stark, J. Rawbone, H. M. Oakley, J. C. Faure and R. Bromley.

REPORT OF COMMITTEE.

The report of the Committee for the year 1901-2 was as follows :—

Your Committee beg to submit their Annual Report and Balance Sheet for the year ending 30th June, 1902.

It is with much pleasure that your Committee reports that a Show was held on the Society's grounds at Rosebank, the 20th and 21st February last, after a lapse of two years. No attempt was made to obtain exhibits from the whole country (as has been the custom in the past), but the Show was held for the benefit of the Western Province only, the unsettled state of the country preventing the participation of the Central and Eastern Districts. Notwithstanding the existence of Martial Law, very little difficulty was experienced in obtaining railway and other facilities, and your Committee desires to record its thanks for the unfailing courtesy and help received from the Military and Railway authorities.

The attendance at the Show was eminently satisfactory, taking into consideration the enormous disadvantages under which it was held. The gate money taken amounted in all to £801 8s. 6d., which compares well with £862 6s. 6d. taken in 1899 during the two days of the largest Show the Society has ever held.

The number of entries was slightly over one-half of that in 1899, the relative figures being 827 against 1,442, but the fact must be borne in mind that the classes for wool, mohair, ostrich feathers, sheep and goats and sheep shearing were altogether excluded on this occasion. The exhibits were less in every class except for poultry and pigeons, 259 entries having been received against 241 in 1899; and in the butter-making competition 10 entries were received, the same number as in 1899. Owing to the restricted value of the Show the prize list was very considerably reduced, but the necessity for this was recognized by exhibitors and accepted in a generous spirit. A few of the Classes deserve special mention. The show of horses, under the circumstances, was very fine, the quality being well up to the average, while some classes were better than in previous Shows. The cattle exhibits were small but the quality good. The show of poultry and pigeons constituted a record both for quantity and quality. The few firms who showed vehicles made a very creditable display. The show of machinery was again disappointing as far as the number of exhibits was concerned, a brilliant exception being that of Messrs. Findlay & Co. of Cape Town, whose striking machinery in motion and electrical appliances were very attractive items and filled the whole wool shed. A large Decorah Windmill at work, and other machinery, were also fixed in the open by the firm named, and the Committee think that the thanks of the Society are due to Messrs. Findlay & Co. for the enterprise they showed.

An unusual item in the Show was a shed filled with pot plants—which formed a pleasing variety. On the evenings of the Show days band performances were held, the first evening in paddock and upper avenue, and the second evening in the main grounds. It is proposed in future to hold a band performance on the second evening of the Show only, and then in the main grounds.

Financially, the Show was a great success, and the Society has funds in hand as will be seen by the Balance Sheet. It is proposed shortly to erect some new buildings on the grounds, to comprise horse boxes, new machinery shed, and lavatories. The whole matter of proposed new buildings is now under the consideration of a Sub-Committee.

During the present winter the Paddock has been let to the Peninsula Football Club, and the arrangement has worked well and amicably. During the past year also the grounds have been let or lent on several occasions, and dog, poultry and pigeon shows have been held thereon.

Your Committee have to record, with great regret, the decease of

the Right Hon. C. J. Rhodes. In his death the Society has lost a true friend and a generous patron.

The following Resolution was passed by the Committee:—
 “That this Society desires to record its sense of the irreparable loss it has sustained in the death of Mr. Rhodes, and recognizes that it owes its present position mainly to the deceased statesman, and that a means of education for all, and an impetus to improved agriculture, would not have been possible but for his generosity. The Society expresses its deep sympathy with his relatives.”

The Hon. J. A. Faure, M.L.C., and Mr. A. Albrecht, two of the original and most prominent members of the Society, have also passed away, and the Committee desires to place upon record its appreciation of the never failing help and assistance given by those gentlemen to the cause of agriculture and the Society.

In submitting the Balance Sheet, a copy of which has been posted to each member of the Society, the Committee congratulate the members upon the satisfactory financial position of the Society; the more so that this is the first year the Government contribution is five-eighths only instead of on the £ for £ principle.

Messrs. P. Ryan, the President, and J. W. Jagger, Vice-President, having resigned their respective positions in consequence of temporary absence from the country, Mr. Alfred Barry was unanimously elected Acting President of the Society during their absence.

Your Committee desire to say that the present Secretary, Mr. J. Wenban, assumed his duties in August last year, and that they are well pleased with his work, and have every reason to believe their choice a good one.

It now devolves upon this meeting, after the adoption of the report, to elect a Committee of thirty members to take the place of the retiring Committee, and also two auditors for the ensuing year.

ALFRED BARRY, Chairman.

WESTERN PROVINCE AGRICULTURAL SOCIETY.

BALANCE SHEET, ENDING 30TH JUNE, 1902.

LIABILITIES.				ASSETS.			
	£	s.	d.		£	s.	d.
Capital				Rosebank			
Account ..	7,928	8	10	Property ..	7,928	8	10
Less Deprecia-				Depreciation			
tion ..	328	8	10	written off	328	8	10
			7,600				7,600
			0				0
Sundry Creditors	..	27	9	Colonial Government Grant	242	10	0
Revenue Account	..	883	9	Sundry Debtors	..	50	16
			8	Balance of Cash	..	617	18
							7
			£3,510				£3,510
			19				19
			7				7

REVENUE AND EXPENDITURE, ENDING 30TH JUNE, 1902.

EXPENDITURE.				REVENUE.			
	£	s.	d.		£	s.	d.
Prizes Awarded ..	441	14	0	Balance from 1901 ..	273	13	4
Show Expenses ..	540	0	1	Government Grant, 1902 ..	242	10	0
Repairs to Yard and Buildings	176	7	4	Donations ..	875	12	0
Ground Expenses ..	84	8	10	Subscriptions ..	141	14	0
Wages ..	149	17	5	Gate Money ..	801	8	6
Salaries ..	102	1	8	Entry Fees ..	72	2	3
Charges ..	46	2	4	Space Fees ..	202	13	6
Rent ..	41	10	0	Rent of Grounds ..	16	4	0
Insurance ..	31	2	0	Certificates ..	0	17	6
Rates ..	70	3	4				
Auditors ..	15	15	0				
Implements ..	19	3	5				
Bonus to Secretary ..	25	0	0				
Balance ..	883	9	8				
	£2,626	15	1		£2,626	15	1

FRED. AYERS

Acting Secretary.

Audited and found correct,

P. O. GRANT,	} Auditors.
J. E. P. CLOSE,	

The Chairman moved the adoption of the report.

Mr. J. W. Versfeld seconded the proposition, which was agreed to.

FARMERS AND THE SOCIETY.

Mr. Dunn (reports the *Cape Times*) said they all regretted the absence of their President, Mr. P. Ryan, but at the same time they felt grateful that he had left for their perusal a circular containing several important points which it was desirable that the society should take up, more particularly the one regarding agricultural education. The speaker thought the prospects for the next show were particularly promising, and if they could only have the co-operation of the country members and of the people who were not members but who ought to be, the success would be more certain, and would not involve so much toil on those who year after year devoted themselves to the interests of the society. It was very much to be regretted that there was such a small number of farmers who contributed anything to the society's upkeep. Let them feel that that was not a society for the encouragement of shopkeepers, but for the encouragement and development of agriculture, not only in the Western Province, but throughout the whole of the Colony. He thought it most deplorable that the farmers of the country had not taken more interest in the society in the past.

Mr. Louw said he endorsed every word Mr. Dunn had said. If they wanted to make the society a complete success, and desired the

farming community to take a bigger interest in it, they must widen its scope as far as possible. He remembered the trouble they had had in convincing the farmers that the society was for their benefit, but they should try as much as possible to get country members on the committee. (Hear, hear.)

THREE DAYS OR TWO?

Mr. Pillans thought they would all agree that the society was run in the interests of the agriculture of the Colony, and to still further that object—seeing that it was fostered in every way by a paternal Government—they should do even more than they had been doing in the past. They should give every chance to young farmers and others who visited the show to see agricultural machinery exhibited, and, if possible, in operation. For that purpose he would make the bold suggestion that in future they have a three days' instead of a two days' show. One day could be for the general public to look around, the second day they could have the jumping contests, and on the third day there could be trials of machinery, with lectures on the machinery by experts of the Agricultural Department. Mr. Pillans thought he was only voicing the views of the Department in saying that they recognised that they did not get their money's worth out of the shows, and many farmers complained that two days did not give them sufficient time in which to look around. Let those exhibitors who wished to take away their stock after two days do so.

Mr. Mellish : I have no objections to three days.

Mr. Pillans : The thing is done then.

Mr. Starke supported the proposal.

A Member : Will Government be prepared to increase their contribution if we have a three days' show?

Mr. Pillans : I cannot tell that.

Mr. Maynard Nash pointed out that if a three days' show were held it would be difficult for the Eastern Province farmers to get away in time for the Queen's Town show.

It was understood that the committee would take the matter into consideration.

On the motion of Mr. Dunn, Messrs. Grant and Close were re-elected auditors.

The proceedings closed with a vote of thanks to the Chairman.

The following is the Committee of the Western Province Agricultural Society for 1892-3: A. Barry, J. A. Brink, H. L. Blackburn, H. Cloete, L. Cloete, G. H. Dunn, J. G. Gie, F. Duckett, J. W. Jagger, J. B. Lindley, E. Mellish, P. R. Malleson, E. Pillans, J. Rawbone, F. Plant, P. Ryan, C. F. Spilhaus, R. Starke, H. R. Stephan, Jas. van Breda, J. S. van der Spuy, J. A. S. Watson, J. W. S. Versfeld, H. Wilman, T. A. J. Louw, J. C. Faure, H. M. Oakley, P. Myburgh, Jan Coetzee and E. Mellish, jun.

A PRESIDENTIAL MESSAGE.

AGRICULTURAL CHEMISTRY.

Mr. Pearce Ryan, late President of the Western Province Agricultural Society, has forwarded the following interesting letter to the members of the Committee :—

It is with extreme regret I find I cannot be with you at this Annual Meeting, particularly as having again entered on our duties, there are so many things to be brought forward, in the vast interests that come within the "sphere of influence," if I may so call it, of this Society.

I must first congratulate every member of the Committee, especially the Chairmen of each Sub-Committee, on the manner in which the several sections were worked up—at what cost only those who take an active part can know—to fit in and work together as one complete machine, thereby meriting, if not assuring, the great success attained.

It would be impossible for me to enter, no matter how briefly, on too many of the subjects above alluded to, but there are one or two of so great importance to the future of agriculture, that I would wish with your indulgence to as shortly as possible mention them, so that they may be thought over.

The first thing I should like to bring forward, is the necessity for some legislative action, so long promised, whereby each vendor of compound or artificial manure would be compelled to produce, when required, an analysis of each kind sold, showing the minimum quantity of active ingredient, as is the case in other countries. But here at once arises a great difficulty. Such a law would, unfortunately, be of little practical value to the great bulk of our struggling agriculturists, unless it were followed up by some well-directed effort to enlighten the farmer of the respective values, commercially and agriculturally, of such ingredients; because, with the exception of a small proportion of our farmers in the Colony, notably within the Constantia area and the Eastern Province, by far the greater number of those whose life's work is centred on the soil are but little, if at all, aware of the important part chemistry plays in the successful production of their crops, and consequently their general well being.

Of course, education is the great factor as a remedy for this state of affairs, and in Dr. Muir we have a gentleman who may be relied upon to push this forward with all possible energy. But to rely solely on the usual progress of education must of necessity be a painfully slow process with the class of agriculturist I have in view, and I would again beg to press forward that some more direct and readier means be adopted to get the immense importance of agricultural chemistry brought home to farmers generally, and in view of the acknowledged unqualified success attained by the lectures of

the butter and fruit experts, who have brought the above subjects to the very doors of those interested.

Why could not such lectures be given on the rudiments of agricultural chemistry by, say, a few of the more advanced students. With an outfit which need not exceed £10 in cost, the subject could be made intensely interesting to both old and young, and could not but awaken interest. A small outfit might also be supplied to certain country schools, where such lessons once a week would be eagerly looked forward to by the pupils, and Dr. Hahn, our kindly and accomplished Professor of Chemistry—a gentleman whose services to this Colony, so long and unostentatiously pursued, we shall never be able to repay—has expressed his willingness to give explanatory lectures to public teachers when assembled in Cape Town for their usual annual congress or gathering, which, he thinks, would be sufficient to enable them to give some useful and simple experiments, so as to illustrate and bring home the main features of plant life and the necessity for the intelligent feeding of their crops.

In advocating these lectures and school lessons, I am perfectly aware of the impossibility to teach chemistry intelligibly to a youth who has perhaps barely passed his third standard, that is, in the sense generally conveyed by the word chemistry. All that can be aimed at is to try to remove that blank, which now exists in the mind of so large a proportion of our farming population, of the essentials of plant food, and to help our farmers' sons, who usually leave school before the very existence of such a science as chemistry is mentioned, and consequently enter on their life's work at a great disadvantage.

The task is not really so formidable, when squarely looked at, as it at first appears. We have only to deal with four of the many needed constituents of plant food, the Nitrates, Phosphates, Potashes and Limes, all other essentials of plant life may safely be taken as at present for all practical purposes in all soils, hence the task is at once much narrowed and simplified. Such lectures or lessons would encourage some to look further into a subject as closely connected with the £.s.d. of their lives, and lead to small but interesting experiments on the soils at their command, and perhaps comparing notes with their neighbours, nothing but good could be done, and at comparatively little cost.

From a host of other subjects which rightly come under the guidance of the Agricultural Department of this Colony, I will only touch on one more, the dealing with which has lately, I believe, been transferred to the Public Works Department, that is, the supply of drills to our farmers for water boring on a limited aided system, which called forth such a hearty response, and was so appreciated by them, that from a Parliamentary return called for a few years ago it was shown that the number of applicants for the loan of such drills was so large, that three years would be required to work off those on the list awaiting their turn, even if no new application came.

in. This was really "how not to do it," for applicants got tired of waiting and gave it up.

By all means slacken no effort in furthering the larger schemes to provide that vital necessity for this country, "irrigation works," but here is a modest and practical means of awakening interest in our vast underground water supply, with all the necessary legislative machinery in working order on a commendable self-help principle, which, if only earnestly put in motion and pushed, or even encouraged (as it ought to be), would lead to hundreds of homesteads being supplied with wholesome water, which if for domestic purposes only, instead of being dependent on the surface supply, would on the score of health alone be of untold value to the Colony. Deeper boring or artesian well-sinking might be safely left to private enterprise.

Before closing, I should like to thank the Horticultural Society, and the Poultry and Bird Society, who so readily gave us their valuable help, also the Forestry Department for their excellent and useful exhibit, so kindly volunteered, and the merchants of Cape Town, who, notwithstanding the heavy previous drain, responded most cheerfully and generously to our call. It is unquestionable that without this assistance the Show could not have been the success it was.

It would also seem ungrateful not to mention how deeply the Committee deplored and felt the loss, in common with not only South Africa, but the whole civilized world, of our great benefactor, the Hon. C. J. Rhodes, from whose ever generous hand the Society received that magnificent gift, the ground on which our show yard stands.

My earnest hope now is, that before another year is passed, not only will peace have been restored and the barriers of Martial Law removed, so that we may again draw our exhibits from the Transvaal downwards, and be fast wending our way to that much wished for United South Africa, under the one Glorious Flag, but also, that the outcome of the conference of Premiers shortly to be held in the old country will be, at least in some measure, an advance towards the binding together, commercially and politically, of that greater Union, the whole of the British Empire.

P. RYAN.

SPAYING COWS.

(By DAVID WILSON in the *Agricultural Journal of Victoria*.)

Combined with strict attention to the first principles of breeding, viz., the use of pure sires on good cows, is the system by which all the leading cattle-raisers in Australia, New Zealand and Canada have kept up the standard and reputation of their herds. Every year, when the cattle were mustered for branding, they took from among the females all the scrubby sorts, bad colours, bad shapes, those that were not breeding satisfactorily, and aged cows they did not want again, and had them spayed. By this one act these cattle were cut off from the breeding herd, and got a fair start to their final destination—the meat market.

The advantage of spaying the culls or inferior, aged, or unprofitable dairy cows has long been recognised, but at no period in the history of cattle breeding in Victoria has the necessity been so apparent as now. The gain to the dairy farmer must be immense, and therefore the more general adoption of the system is a matter of the greatest importance to the welfare of the industry.

With the rapid growth of the dairying industry, and the consequent demand for milkers and springers, the tendency has been to get every cow and heifer in calf, so that they might be sold as milkers. Every available animal has been bred from, irrespective of its butter-producing qualities; and the sires used have been, in many instances, scrubby mongrels, without breeding or any other object, except that of perpetuating their kind. The result is plainly evident to anyone attending the country sale-yards. It is almost impossible to buy a line of steers or heifers without getting along with them a large percentage of ill-shaped, bad coloured, and under-sized cattle. The system of sending culled dairy cows into the markets to be sold as milkers or springers tends to depreciate the value of really good milkers, while it perpetuates the race of inferior dairy cows. The unfortunate buyer of these animals is saddled for the season with unprofitable dairying cows; and he, in turn, will put them on the market to be sold again. So the game goes on until age or death puts an end to these unprofitable ones. Even in the first place, if they are sold as stores for fattening purposes and not spayed, a large percentage of them, before they are fit for the butcher, prove in calf, and are sold again to the dairyman as springers.

With the increasing competition in the dairying industry, and the scarcity of good steers for fattening purposes, it is high time that every dairyman should pay attention to the class of cattle he is breeding and keeping, and aim to raise the standard of his herd with regard to butter production and general usefulness.

To show what room there is for improvement on the average profit-producing capabilities of the dairy herds of the State, it is

only necessary to mention the competitions conducted during the past four years, and instituted by the proprietors of the *Leader* newspaper—the prize for which last year was won by Mr. Goldie, of Port Fairy. His cash return per head per year for twenty-seven (27) cows was £14 8s. 6d. for milk alone, and, although numbers of dairymen in the western and other less favoured districts of Victoria are getting a return of £10 per head, yet the average return for the whole of the State is under £5.

There can be no question, therefore, that many dairymen are keeping in their herds cows that are not payable butter producers. These animals are *actually* eating up the profits of the good cows; they are *lowering* the cash return per head. They are making extra labour in milking, and are living on the food that would keep profitable cows.

The only way for dairymen to find out which is their profitable cows is to have the milk of each cow weighed during the season at intervals; have each individual cow's milk tested by the Babcock test; keep a book with the records of the weight of the milk of each cow and the average test of her butter fat, and he will soon find out whether the cow is profitable to keep or not. When a cow is proved to be unprofitable for butter producing, *spay* her, and thus protect the dairying industry by making sure that she will go to her proper destination—the meatmarket. The testing of each individual cow by the aid of the Babcock test and the milk scales is the exception, and not the rule, so far in Victoria, *but it will become general*. The progressive dairymen that have taken it up are, by its assistance, rapidly culling their herds and raising their profits per head. It is a proved fact that without individual testing with the aid of the milk scales and Babcock test, or churn, that it is impossible to cull the dairy herds to advantage; and the dairymen that continue to carry on their business without it are, in a manner, working in the dark.

In regard to spaying cows for milking purposes, it is proved beyond doubt that if a healthy cow is spayed six or eight weeks after calving when in her full flush of milk, and then fed well, that she will milk on an average about three years profitably. The method is valuable in regard to cows for supplying hospitals, private families, cities, etc., on account of the uniform quality of milk given, but *especially valuable* to dairymen as a means of dealing with their *aged* cows profitably. When a cow in a dairyman's herd reaches the age of eight or nine years it is, as a rule, time to get rid of her. If she is spayed about six weeks after calving she will milk on with profit for a season or two, during which time she will improve in condition, and afterwards be disposed of as a forward store, or fattened for the butcher, and her place in the milking shed can be replaced by a young fresh cow.

When the first exhibitions and instructions in spaying were given, a good deal of misunderstanding on the subject arose in the minds of the general public, many of whom got an idea into their heads that

the Department of Agriculture was advocating the wholesale spaying of dairy herds, so that they could be milked continuously for a number of years. Such is not the case, and such a foolish idea would simply be laughed at by practical men living under our climatic conditions. The cattle that are being operated on are the culls, or unprofitable butter producers, and the aged cows that are intended for milking on for a season, and then fattened for the butcher.

The spaying of cows for milking on for a season or two before they become too old is very important, and must result in undoubted benefit to the country. In travelling among the dairy herds of the State it is astonishing to see the large number of old cows that are kept for milking purposes. These aged cattle *must* be absolutely unprofitable to the owners, for it is not reasonable to expect a cow of thirteen years, and perhaps older, on native pastures, to give a profitable supply of milk and also produce a calf.

Dairymen must bear in mind when culling their herds that strict attention must be paid to the *first principles* of breeding—that is, the use of pure sires on their good cows. Let them aim at breeding a general-purpose cow that will give a payable quantity of butter fat and will, when done for milking, have a fair carcase of beef. In a rich district use the Shorthorn sire for preference; the Shorthorn and Ayrshire or Shorthorn and Jersey cross produces a fair-framed animal. The steer calves bred in this way will meet with a ready sale, having well-developed frames and decent shapes for fattening purposes.

That great interest is taken in spaying instruction is shown by the amount of work done during the past season; it also shows that the work is highly appreciated, and the dairymen recognise the great value of it in dealing with their culls and cows that are getting up in years; and also as a means of raising the standard of their herds in regard to butter production and general usefulness. In different districts of the State there has been given a total of 260 practical demonstrations of spaying; 350 dairy farmers or graziers have given cattle to be operated on; 3,030 cattle have been spayed, and 5,630 interested people attended the various exhibitions; and, although the operations included the work of about 200 pupils, the loss from deaths has been under one in 200, or about half per cent. The very small percentage of loss has given confidence to the cattle owners, and is proving to them that spaying can be carried on without serious loss and with great profit.

To make a paying business of their dairy herds, dairymen must at once face the problem of making provision for winter feeding, and of providing shelter for their cattle from the cold bleak winds and rains. Until this is done their butter supply will be irregular and their profits uncertain.

Aim at keeping good profitable cows, and *feed them well*. Then, with all the advantages of scientific dairying, success will come.

HEARTWATER IN CALVES.

BY CHAS. P. LOUNSBURY, Govt. Entomologist.

Calves seem subject to heartwater. They may acquire a disease that appears to be heartwater through the attack of Bont ticks, and through the medium of Bont ticks the same disease may be transmitted from sick calves to susceptible calves or to susceptible sheep or goats. These are conclusions reached from experiments that have been in progress during the past four months. A report with full details will be submitted later as part of the Entomologist's annual report for the current year, but the investigation is of sufficient interest to warrant the publication of the main features at once.

At the outset it may be stated that the disease appears much less fatal to calves than to sheep and goats, and that no direct test has been made to determine if adult cattle are susceptible. The experiments have been on a small scale with meagre accommodation and facilities, but their uniformly positive results fully justify the qualified statements made above. It may be that the disease is not recognized at all even in the worst heartwater districts as a specific trouble amongst the many ills of cattle, and fairly certain it is that if it is recognized it is not known as "heartwater" nor in any way connected with heartwater. The experiments began with the testing of Bont ticks, known to be capable of transmitting heartwater to goats, on two calves. The chief circumstance leading to this test was the recorded evidence of Mr. John Webb before the Cattle Diseases Commission in 1876 that calves began to do badly coincidently with the appearance of the Bont Tick, and a note in a report from the East London Magistrate, in 1875, that sheep and calves were becoming increasingly difficult to rear in the western wards of his district. The writer discussed the matter with Dr. D. Hutcheon, the Colonial Veterinary Surgeon, and learned that whilst the failure of sheep was due to heartwater the failure of calves was probably due to "liver-sickness," a disease which came into notice about the same time as heartwater and which has spread over much the same territory. However, Dr. Hutcheon agreed that a test of heartwater ticks on calves was desirable, and he himself procured the two calves for the experiment, selecting two healthy, six months' old animals from the herd of the Elsenburg Agricultural School. The three other calves used later also came from this herd.

Both calves were kept under observation in the experimental shed, located in the heart of Cape Town, for ten days, and were then, on March 29th, infested with one hundred Bont Tick nymphs that had, as larvae, fed on a heartwater-sick goat. The goat had come from

Somerset East and the ticks were the progeny of specimens collected near Bowden in the Albany district. At least forty-seven ticks fed to repletion on "Calf No. 1" and seventy on "Calf No. 2"; every one was off by April 8th. Up to April 17th, nineteen days from the application of the ticks, the animals remained in normal health and temperature. On the 18th both were in fever, and two days later they were visibly ill and disinclined to feed. No. 2 remained feverish for ten days and then rapidly recovered in appetite and condition. No. 1 became prostrate on the morning of the 22nd and died the same evening. It lay on its belly for several hours before death, quite unable to change its position. Frequent moans, convulsive tremors of the body and writhing of the limbs showed it to be suffering severely. It was opened on the following morning by Dr. Hutcheon and Veterinary Surgeon Robertson, but beyond a much inflamed mesentery, all the organs were found practically normal. There were none of the usual lesions of heartwater except a few small petechiæ in the heart, and there was no excess of fluid in the heart-sac as is almost always the case in ordinary heartwater in sheep and goats. Smears of blood were taken from various organs and examined microscopically, but no organisms of any kind were discovered.

Large numbers of larval Bont ticks were applied to both animals when fever became apparent. Those applied to No. 2 had time to feed, and were recovered between the 25th and the 30th of the month. Blood was drawn from No. 1 on the 21st, and two goats inoculated with it, each receiving 8 c.c. Blood was drawn from No. 2 on the 25th and two sheep inoculated, each with 5 c.c.

The blood of No. 1 proved fatal to both the goats inoculated with it, they becoming ill on the eighth and tenth days respectively, and succumbing on the eleventh and thirteenth. The incubation period was about the same as would have been the case with ordinary heartwater, and during their fevers both animals behaved as they would have from ordinary heartwater, the heart action becoming rapid but very weak and fits occurring towards the end; yet the *post-mortem* examinations showed an almost entire absence of lesions. Blood was drawn from one, and two other goats inoculated, each with 5 c.c. These animals became fevered and died, and from one of them two more were infected, and thus the strain of the disease was carried along until it had been passed through six series of goats. All the animals succumbed between eight and fourteen days from their inoculation. The first removes, as already stated, showed almost no lesions at death. The second removes showed somewhat pulpy spleens and slightly inflamed intestines. The third removes showed acute inflammation of the fourth stomach, intestines and brain. One of the fourth removes showed fairly typical heartwater lesions, there being about six ounces of heartwater fluid in the chest and some excess in the heart-sac; the other fourth remove was sent to Veterinary Surgeon Borthwick, who reported that at death he found an ounce of heartwater fluid in the heart-sac and congestion of the

fourth stomach. The fifth remove, one goat only, had fully one and one-half ounces of fluid in the heart-sac and a small amount in the chest, and in still other respects seemed a true case of heartwater. One of the sixth removes had between four and five ounces of fluid in the heart-sac and about one ounce and one-half in the chest, and the fourth stomach and entire small intestine were acutely inflamed. The other sixth remove yielded no fluid in the heart-sac or chest but a small quantity in the abdominal cavity. The intestine was but slightly inflamed. In almost all the cases there were fits as is generally the case in fatal heartwater.

The blood of calf No. 2 proved infectious to both the sheep inoculated with it. One died on the sixteenth day with its heart-sac greatly distended with fluid. The other survived its fever and has since proved resistant to heartwater, the test being by pathogenic ticks.

The ticks which were applied to calf No. 2 during its fever, and which were recovered after feeding, shed their larval skins in due time and thus became ready for their nymphal feeding. It should be carried in mind that the particular species of tick concerned, the Bont Tick (*Amblyomma hebraeum*), is innocuous as far as regards heartwater when a larva, but that, if as a larva or nymph (the second feeding stage) it feeds on a heartwater-sick animal, it derives infection that it may transmit in its next feeding stage, that is as a nymph or an adult, to a susceptible animal. Therefore if calf No. 2 had been ill with heartwater the ticks from it should transmit the malady. Tests were made on two calves and four goats.

Calf No. 3, an animal about six months old, was infested with the ticks from No. 2 on June 6th. At least thirty-three specimens fed. On July 1st fever set in and continued until the 12th. During this fever period the animal ate little and became very thin. On the 10th of the month it could scarcely keep its feet, but since the fever abated it has improved daily. A goat was inoculated from it on the 10th and ten days later this animal sickened. It died on the 21st after a severe fit, and on examination the same perplexing absence of severe lesions that characterized many of the earlier cases was noted; however, there was some excess of fluid in the heart-sac, and the spleen was enlarged and "pulpy" as is ordinarily the case in heartwater. The fourth stomach, large and small intestines, and brain were all slightly inflamed. Calf No. 3, it should be mentioned, was in the stable about five weeks before the infective ticks were applied.

Calf No. 4, like No. 3, was infected with Bont nymph ticks that as larvæ had fed on No. 2 during the fever period. This animal was only ten or twelve weeks old when received May 17th. It was at once infested with about fifty ticks, but none appeared to bite. On May 26th about forty more were applied, and of these twenty-two are known to have fed. Fever set in June 18th, twenty-two days after the second application of ticks, and, as in the previous cases, loss of appetite and condition soon occurred. After ten days of fever the animal began to scour and at once became prostrate. It

lingered on, still scouring, for several days and was despatched as it was dying on July 3rd. The lungs and heart were found to be healthy, and there was no excess of fluids or anything else to suggest the usual heartwater lesions found in sheep and goats. The fourth stomach was ulcerated and the large and small intestines much inflamed. One goat was inoculated from this calf on June 25th. It came into fever on the thirteenth day and died two days later. The heart was found healthy. There was no pericardial fluid but six to eight ounces had exuded into the chest. The spleen was very soft. The fourth stomach was very much inflamed and the intestines slightly inflamed.

Three goats were infested with ticks from calf No. 2 on May 13th. Two of the animals had been in the shed for about two months and the other for a few days only. The first ticks failed to take hold, so more, about forty to each animal, were applied May 20th. Few of the second lot attached and a third application was made May 27th. Twenty to twenty-four specimens in all were recovered after feeding from each goat. One goat came into fever June 7th, another June 12th, and the third June 14th. All three died after a few days of high fever, and all suffered fits towards the end. The *post-mortem* examinations revealed very little that was abnormal. In two of the cases there was a slight excess of fluid in the heart-sac and in one there was a little fluid in the chest. One showed a slight congestion of the brain and another slight congestion of the fourth stomach and intestine.

A fourth goat was infested with about forty of the same lot of ticks from calf No. 2 on June 21st. Eleven specimens fed. Fever appeared July 13th and death followed in two days. There was nearly an ounce of fluid in the heart-sac and about three ounces in the chest, and the spleen was enlarged and pulpy. The stomach, intestines and brain were slightly inflamed.

A repetition of the test of heartwater pathogenic Bont Tick nymphs on a calf was made on No. 5, an animal about six months old that was brought to the shed on June 5th. The ticks were of a different lot than those applied to Nos. 1 and 2, and their capacity to transmit heartwater was affirmed by the infection of a lamb by a few of them; the case produced was perfectly typical heartwater. One hundred of the ticks were applied to No. 5 on June 14th and about twenty-one were subsequently recovered after feeding. The presence of fever was uncertain until July 12th, twenty-eight days after the ticks were put on; then, after four days of fever, the temperature fell to normal and has since so remained. The usual absence of appetite and falling off in flesh took place, but at no time did there seem acute disturbance of the health. On July 18th, after the fever had lapsed, blood was drawn and 5 c.c., the usual quantity used in the experiments, injected into a goat. Fever appeared July 28th, and terminated fatally, following the usual fits, late on August 2nd. A slight excess of fluid was found in the heart-sac, and there was slight inflammation of the fourth stomach and upper portion

of small intestine, but on the whole there was little in the appearance to suggest disease of any kind.

It is to be observed that in the transmission of the disease through the calves back to goats again, and in its subsequent transmission through six removes of goats from calf No. 1, the ordinary lesions of heartwater were usually absent in whole or in part; yet there seems no doubt whatever that in every case the infection transmitted was that of heartwater. The experiments were carried on with the kindly aid of the Veterinary Department and of Dr. G. W. Robertson, the Bacteriologist of the Health Department. Dr. Robertson examined blood smears of various organs from many of the cases but in only one did he detect any organisms. This exception was in the case of a sheep and the organisms were those of "bekziekte," a malaria-like disease with which the animal had been infected in an earlier experiment.

A sheep that was kept in the shed with the calves as a control animal remained healthy throughout all the experiment, and no indication of illness occurred in three goats kept as control animals in the shed with the goats that were used.

No marked cedema of the lungs characterized a single case; in fact the lungs were nearly always normal in appearance with at most a slight distension of the interlobular spaces. The gall bladder, the seat of half the ills of stock in the average farmer's estimation, entirely lacked uniformity in size and contents. The bile was sometimes copious and sometimes scant; sometimes normal in consistency and sometimes thick and slimy.

QUEENSTOWN POULTRY SHOW.

The Queenstown Poultry Show, held on the 23rd ult., is described as the best ever attempted on the Border, and doubts were expressed whether it has ever been surpassed outside the Metropolis. The *East London Dispatch* speaks in high terms of the Show and supplies the following note on the exhibits:—

The Black Orpington, in which there were no less than 25 entries, was remarkably well represented, and Mr. Wade, of East London, is to be congratulated in being the leading winner, when many of the other exhibits were of such undoubted quality. There were nineteen Buff Orpingtons. Perhaps the Judge was not quite happy in his selection of some of the prizes in this class, but the winner of the first prize for cocks (Mr. A. G. Butow) has certainly cause to be congratulated upon a well-deserved win. Mr. Butow bought his third from William Cook & Sons when in East London a fortnight ago; he won first at the East London Show and was successful

again yesterday. Mr. Butow has reason to be proud of his own selection. Mrs. Sutherland of this town, whose birds (cock and hen) pulled off first and second in the Colonial section of this class, has reason to be gratified, having reared the birds from eggs bought locally. There were some very good birds in the Plymouth Rock class, but it is more and more evident that the breed is not so popular as once it was; gradually this hardy utility fowl is being supplanted by newer breeds; time will tell whether or not they are better. In the Wyandottes there were thirty-eight entries. Mr. J. H. Nuttall, of Kei Read, the premier Wyandotte fancier in this part of the country, did very well, but Mr. T. E. H. Peacock, a rising fancier in this town, runs him very close. Mr. Peacock has reason to be proud in having pulled off the first prize with a silver chanticleer of his own rearing. And, by the way, it may be mentioned here how pleasing it is to see show committees encouraging the breeding of prize birds by creating separate classes. Many fanciers consider that the man who wins with an imported or purchased bird is entitled to lay very little unction to his soul, it being an achievement of the pocket, whereas the man who raises his stock and wins has the satisfaction of knowing that he has done something towards it by industry. The towering Langshan was but poorly represented, but Indian and other Game occupied twenty-three pens. This class of bird is more largely represented each succeeding year. They are undoubtedly good table birds. Nearly all the prizes went to East London, Mr. S. Dredge and Mr. Wade. Queenstown fanciers do not seem to appreciate the breed as yet; perhaps their ungainly appearance in the opinion of some is the cause of it. The lighter breeds, Minorca and Leghorn, are as popular as ever, and people who breed for egg production are undoubtedly wise in favouring such breeds, but among the egg producers the Silver Wyandotte deserves a place also. It was rather disappointing, though not altogether surprising, to find breeding pens so poorly represented, but probably most breeders did not care to disturb the families just as they were settling down to their business of continuing the species.

KIMBERLEY POULTRY SHOW.

The third Annual Show of the Griqualand West Poultry, Pigeon and Cage Bird Club was held at Kimberley on the 2nd inst. and was a great success. The entries were in excess of previous shows and many were sent up from the Cape Peninsula. In some notes on the exhibits the *D. F. Advertiser* says:—

Mr. W. A. Humphries, Cape Town, took first honours for the best cock (Orpington) in the show, and also for the best hen on show (a Plymouth rock). These birds are the best that have been seen in South Africa for many years past, and have taken high honours

wherever exhibited. The cock was shown with two hens, including the one mentioned above, no fewer than six specials going to this pen. Mr. James A. Smith's black Orpington cock took a first and special, being of good quality, but just a shade small. Mr. Place (Cape Town) took a first and special for his Orpington, a good and sound buff, the only fault being that it was slightly white on the tail. Social Farm (Salvation Army) took a first with a good typical Orpington hen, which wanted a trifle more colour to be perfect. Master Giddy's golden Wyandotte, which took first prize and a special, was rather small, and failed somewhat in the barring on the wings. Social Farm took first prize and a special for the best silver Wyandotte, which was about one of the nicest hens seen in Kimberley, being about as finely laced as possible. Mr. Kidwell's Malay game hen took first prize in its class, and, we think, took a first last year as a pullet, but was just a trifle lighter than is desirable. Mr. Bennetto gained the first and second prizes for Indian game cocks, last year's champion being placed second this year. Mrs. N. S. Brown's Indian game hen, which won the first prize, was of good shape, but failed slightly in marking. Mr. Hildebrandt (Cape Town) took first and a special for his black-red Indian game cock, a good up-standing bird, but rather long in the sickle feathers. Social Farm took a first and special for a good typical Minorca hen, the bird winning on condition. Master Giddy's Ancona hen, which took a first and a special, is one of the best of its kind seen in Kimberley. Social Farm took the first and a special for a white Leghorn cock, a good up-standing typical bird, but failing slightly in lobe and condition. Social Farm also took first prize for white Leghorn hens, their bird failing slightly in face. The first prize was withheld for brown Leghorn cocks, the second going to the Social Farm for a good bird, whose only fault was that the comb had gone over. Mr. Delpont took a first and special in the Hamburg hen class, his bird being neat and carrying a good comb; Master Giddy was second in this class with a very neat gold-spangled hen. In the pure-bred cockerel class Mr. W. A. Humphries took first and special prizes for a good typical black Orpington, which failed somewhat in comb. Mrs. N. S. Brown scored an easy win in the pullet class for a very nicely-laced silver Wyandotte. In the pure-bred Colonial cock class the Social Farm took first prize for their white Leghorn, which was a good typical bird, though failing considerably in face. Mr. G. H. Stoney gained the first prize in class 57 for a very nice even lot of buff chicks. Mr. Bennetto was awarded first prize for game cock bantams, his bird being a typical Malay, the second prize going to Mr. Revell's black red, which was slightly out of condition. In the class for game bantam hens, Mr. W. G. Hastee, of Cape Town, gained the first prize, his bird being the soundest in face, though losing slightly in colour. Master Giddy's Pekin bantam hen secured a first and special. Mr. Hildebrandt secured the first and special prizes for his duck, a good deep-keeled Aylesbury.

CORRESPONDENCE.

The Urgency of Irrigation and Mr. W. Willcocks' Report.

To the Editor of the AGRICULTURAL JOURNAL.

Sir,—In concluding his report on Irrigation in South Africa, Mr. Willcocks wisely and with undaunted expert engineering foresight said that “without such agricultural wealth to lean upon, the exhaustion of the mines will plunge the whole country into conditions of poverty which no statesman of His Lordship’s ability and devotion can contemplate without dismay.” I am therefore exceedingly glad to notice (being deeply interested in irrigation works) that Mr. Willcocks, in compiling this important report, did not fail to avail himself of the Public Works and other Departments, and also was met and accompanied by the right man as he went along. It is no wonder that this greatest and most important report on irrigation caused a pleasant sensation among the more enterprising of the community. We cannot all entirely depend and expect to rely on the wealth of the mines.

Mr. Willcocks has very ably moved the curtain aside for those whom Providence has endowed with a mind’s eye to better behold the enormous prospects contained in the development of the agricultural resources of South Africa.

In casting a glimpse at the remarks by an irrigation farmer of the Eastern Province on Mr. Willcocks’ report, I am at a loss how to give vent to my feelings, *i.e.* whether to laugh or cry. I know there is no space in the pages of your valuable journal for broad and extensive refutations, so I will therefore just refer to this one sentence, “It is not the rule that land pays for irrigation, but the exception.” I am very sorry that ideas like these should have been expressed by a South African farmer, and that with regard to the soil of the country. These few misleading words I am afraid can be employed as a powerful lever to dislodge or shake the foundation stone of the valuable superstructure that must have caused the conscientious engineer many pains in erecting.

I belonged to the Oudtshoorn District for a good few years. To a man that District, and I have no doubt the surrounding Districts, will declare that an indisputable contrary is the case. As I have said before, I am deeply interested in irrigation works. When still under my father’s care I superintended the construction of valuable works.

The value of the operations carried out for the purpose of irrigation while I was farming in the Oudtshoorn District, will speak for

themselves without a doubt. Now this is why I am able to appreciate and even to admire the greatness and importance of so much of Mr. Willcocks' report.

It might be of some use to refer to the past just again. In 1884 I left the District of George with two heavy wagon loads for Johannesburg. At Bloemfontein I changed my mind. Fever was raging at the then poor gold fields. My object now was Bechuanaland, then Stellaland, and a hunting trip into Kalahari, which I accomplished. While at Bloemfontein, I approached the old President, the late Sir John Brand, with the object of obtaining a State concession to undertake irrigation works, the State to provide for funds. I tried hard then to impress on the mind of the old President the great importance of such works; but his reply was that the State had no money to devote to irrigation schemes.

On returning from Bechuanaland I visited Barkly West and travelled along the Vaal River to Kimberley. What I saw soon passed everything that had appeared to me so enchanting in the Free State. I could not rest; something must be done. Having made the late Mr. Rhodes's acquaintance at Vryburg while treating with the Van Niekerk and McKenzie parties, I approached him and suggested an Irrigation Scheme along the Vaal River; but the guiding needle of enterprise pointed to the North and he offered no co-operation. In 1893, still alive as to the impression of 1885, I went down, got a trustworthy land surveyor at Kimberley, secured concessions and took the levels of the Vaal River. I then saw the prospectus of Mr. Rhodes's "Vaal-Harts River scheme"; which, as I expected, was not started.

As all are aware, during last session of Parliament the late right hon. gentleman was anxious to obtain a vote for the carrying out of his scheme, now grown to enormous dimensions.

With a deep impression of the circumstances and facts faintly sketched above, I grieve that things are still undone. The beautiful Vaal is still allowed, as her massive volume is rolling along, to waste millions upon millions of gallons in the great ocean. The great Colossus on whom all eyes were fixed, and who delighted to grapple with a task because it was gigantic, has disappeared from the scene. A terrible loss.

South Africa ought to be deeply sensitive of the services rendered by H. E. Lord Milner inasmuch as the great question for the country's future welfare is that of offering a home to thousands waiting anxiously to come. The question of making South Africa great in population, great in agriculture, great in commerce, great in the rank of great countries, has received the immediate attention of his guardian eye, and how many will yet congratulate His Excellency on the success of his choice in securing the services of Mr. W. Willcocks.

In conclusion, I am delighted to find that my reflections and humble opinion of years gone by with regard to this momentous question are in keeping with the opinions of so great an expert as

Mr. Willcocks. It is my earnest desire now to see the suggestion of that practical engineer immediately carried into effect.

I am, etc.,

Worcester, June 20th.

JAN. V. D. WESTHUIZEN.

Oversea Eggs for Setting.

To the Editor of the AGRICULTURAL JOURNAL.

Sir,—In your last issue, A.D.C. asks if eggs for setting can be imported by parcel post with any successful results. I would advise A.D.C. not to try the experiment until perishables on our railways are more carefully handled.

I imported 3 months ago from Simon Hunter, of the Yorkshire Poultry Farm, 5 settings of prize Black Minorca eggs, and on arrival here the eggs were oozing out of the boxes. On opening them I found six eggs broken but perfectly fresh, proving conclusively that they had been broken through the rough handling they had received on our railways after their arrival in Cape Town, notwithstanding the boxes were labelled in large letters *Eggs for Hatching*. I set the remainder (65) under 5 hens, and on testing them on the 14th day found every one to be rotten.

I might just add that there was no delay in transit, the eggs arriving here under 30 days.

Yours, etc.,

G. W. TURPIN.

Waterford, Kubusie, 14th July, 1902.

To the Editor of the AGRICULTURAL JOURNAL.

Sir,—In your issue of June 19th a correspondent asks information on the above subject, and you make the statement that you are collecting information. You may, therefore, be interested to learn that in May or June, 1894, I brought a dozen Plymouth Rock eggs from Portsmouth to Stellenbosch, where they were set, with the result that *ten* healthy chicks appeared. The eggs were packed in a flat wooden box—only one layer of eggs—and this box I left lying on an empty berth near a port hole on the shadier side of the R.M.S. *Scot*. *Every morning I turned the box over.* To and from the vessel I carried the box in my hand with great care.

I am, yours faithfully,

B. DE ST. J. VAN DER RIET.

Somerset Strand, July 19th, 1902.

To the Editor of the AGRICULTURAL JOURNAL.

Sir,—In reply to your correspondent A.D.C. I may say that some 4 years ago I made the experiment of getting 3 sittings of eggs out by parcel post. The eggs came from a well-known Yorkshire breeder and arrived safely barring one, which was slightly cracked. The eggs were given a rest of 24 hours and set under hens who sat very well, but not one germ showed signs of development after the 21 days were over. A friend of mine got some eggs out from the same breeders, but he made arrangements with the butcher on board the steamer to place the eggs in the cool chamber, also to turn them occasionally, with the result, I believe, of 5 chickens hatching from the dozen eggs received, and that too in an incubator!

I am, &c.,

Uitenhage, 11th July, 1902.

W. KONSCHER.

COUNTRY REPORTS.

THE TRANSKEIAN TERRITORIES.

Bizana.

MAJOR H. SPRIGG, R.M., 2nd July, 1902.—The weather during the month has been dry except three days of terrible cold rain and wind in the early part, which, fortunately, caused very little loss of stock here. I have nothing to add to last month's report *re* the harvest.

Elliot.

J. P. CUMMING, R.M., 30th June, 1902.—We have had a very heavy fall of snow during the month, which I regret to say has done considerable damage to stock. Ploughing has commenced.

Engcobo.

C. A. KING, R.M., 7th July, 1902.—The weather during the early part of the past month was very dry, but about the middle of the month the district was visited by a blizzard which, I regret to say, killed a number of stock. Total rainfall for the month 5.3 inches. All crops have been harvested, and stock, both large and small, are in very fair condition. Pasturage, although dry, is plentiful.

Flagstaff.

J. H. ROOSE, R.M., 30th June, 1902.—During the past month a very severe storm swept over the district with exceedingly cold rain, causing considerable losses among poor stock. I estimate the loss in the district at 45 horses, 100 head of cattle and 300 sheep and goats. It rained continually without break from 8 p.m. on the 9th June to 6 a.m. on the 11th June, and the rain gauge for the period registered 11.49 inches. This is the heaviest rain known to have fallen here in such a short period as 50 hours. A large number of trees were blown down, and several native huts were also blown down and some struck by lightning. The rain has done some good to the pasturage, which was becoming very hard and wiry. The natives have now practically finished reaping, and grain is selling to traders at from 8s. to 10s. per bag.

Idutywa.

F. E. C. BELL, R.M. 8th July, 1902.—The recent heavy rains and gale destroyed a large number of large and small stock. I estimate the value of the losses at quite £6,000. There has been no rinderpest since May. All infected animals have been released from quarantine. At the kraal where the disease last made its appearance only three animals died.

Kokstad.

W. P. LEARY, ACTG. R.M., 30th June, 1902.—In the early part of June high winds prevailed and the weather was fairly warm until the 10th, when there was a change and a nice rain fell. This continued until the evening of the 11th. A terrible blizzard raged on that night, doing considerable damage to stock and property. The rain which fell previous to the storm having thoroughly drenched everything, stock were unable to stand the piercing cold and many hundreds of cattle and horses and thousands of sheep perished. The upper part of the district is still under snow and it is difficult to communicate with it. The mealie crop this season is far below the average and the yield per acre very poor. There will be a shortfall in this cereal. Winter feeding for stock is plentiful and improving. Stock are in good condition, and given a spell of fair weather will do well. There have been no fresh cases of disease reported, and it is now over a month since the last case of lung-sickness occurred in this township.

Libode.

J. C. GARNER, R.M., 10th June, 1902.—The terrific gale of wind and rain which commenced on the evening of the 10th of this month and continued during the two following days caused a tremendous amount of destruction throughout the whole of this district. Not only was there a great loss of stock, but I very much regret to say that about 30 persons perished in different parts of the district from exposure. I am obtaining from each Headman the total loss of

various kinds of stock in their respective locations, and shall be able to give you a detailed description of the losses in my report of next month. The Township escaped fairly well, but I am sorry to say that "Garner Park" experienced the full fury of the gale and a large number of trees of various kinds were uprooted, and it will be many years before the Park assumes its former high standard of perfection. It has been indeed most disheartening for me. Harvesting operations have now been brought to a close in the district, and I am sorry to say that the yield of mealies is not so good and abundant as one as was at one time anticipated. Good prices have, however, been realised for the new grain, and as much as 25s. per sack of 220 lbs. has been paid by the trading community to the natives. There is a fair yield of Kafir corn. Stock of all kinds are in fair condition for the time of the year and there is no disease prevalent among them. The pasturage is still very good and abundant.

Lusikisiki.

C. W. CHABAUD, R.M., 30th June, 1902.—The reaping of the season's crops of mealies and Kafir corn is over and the yield of the former has proved to be much below the average. Stock are feeling the winter and are somewhat low in condition. On the 10th and 11th inst. heavy rains accompanied by unusually high winds fell, and the cold was so intense that in many instances fat, healthy cattle succumbed to its effects.

Mqanduli.

L. FARRANT, R.M., 4th July, 1902.—The harvest has, I regret to say, been insufficient for the hope that the natives will be supplied until next year. Stock in good condition and healthy. A case or two is reported of redwater in which those stock recovered. Winter lambing has commenced and the lambs are healthy and strong. On the 16th June last the district suffered a hurricane of great severity, and the loss in horses, cattle, sheep and other small stock, including hundreds of fowls, was very heavy. One trader had his station blown down and most of them even lost one or two head of cattle.

Matatiele.

F. J. REIN, R.M., 30th June, 1902.—The past month was marked by a severe fall of snow, which commenced on the 10th and continued until the night of the 11th, when a heavy wind set in which did great damage to stock. Thousands of sheep succumbed to the snow drift, and losses in cattle and horses were also heavy. The snow in parts lay 15 feet deep, and whole flocks were buried with no possibility of digging them out alive. The farmers, however, struggled manfully to rescue what they could, and cases are reported where sheep which were entombed from 18 to 20 days were saved. This cold weather has brought down the condition of stock very much, and most of them would not survive another blizzard. The farmers,

however, entertain sanguine hopes of the return of an early Spring, the ground being saturated to well below the subsoil. Several outbreaks of lung-sickness occurred and have been dealt with in the usual manner.

Maclear.

D. PINKERTON, ACTG. R.M., 5th July, 1902.—There is little to add to the last report from this district. There was a heavy fall of snow during the early part of the month and the loss of stock which it occasioned in this district was enormous. All traffic was suspended for about 12 days.

Mount Fletcher.

J. C. HARGREAVES, R.M., 30th June, 1902.—During the month a severe snow storm visited the district. Rain fell on Tuesday the 10th and snow commenced that night at about 8 p.m., continuing until Thursday morning without a break. On the night of the 11th the wind developed into a blizzard and the cold became intense so much that a great many cattle died from the extreme cold. Nothing like it has been experienced by the oldest resident in the district. I am collecting statistics as to losses and will forward same as soon as possible. Stock in consequence of this snow storm and the heavy frosts which have followed have gone down in condition but otherwise healthy. The rain gauge has registered close on 6 inches during the month. Reaping has now been completed, but the crop has been a disappointing one and I am afraid there will be a scarcity of grain.

Mount Ayliff.

G. BARRETT, ACTG. R.M., 30th June, 1902.—The long spell of clear bright weather referred to in my last report continued until the evening of the 9th inst., when heavy rain set in which continued to fall almost without cessation until the night of the 11th, when a perfect hurricane of wind arose accompanied by ceaseless rolling of thunder, a heavy fall of snow and intense cold. The loss of stock of all kinds and damage to property is considerable. The pasturage continues fair and surviving stock is looking well. There is every indication of an early spring.

Mount Frere.

H. B. GARNER, ACTG. R.M., 7th July, 1902.—The natives in this district have finished harvesting their crops, which are not equal to early anticipations. A severe snow storm was experienced about the middle of the month, accompanied by cold winds, to which about 6 per cent. of the stock in the district succumbed. Lung-sickness is decreasing, no fresh cases having been reported. All stock are in fair condition considering the state of pasturage, which is far from good.

Nqamakwe.

R. G. MACLEOD, ACTG. R.M., 2nd July, 1902.—The rainfall for the past month was heavy. The rain fell in the early part of the month. It was a cold rain and many natives lost very heavily in cattle, sheep and horses. The natives have been reaping their mealies and Kafir corn. The season has been very poor; many natives have not reaped anything at all. The veld is very dry, but notwithstanding the dryness of the veld and the cold weather the cattle and sheep are in fair condition but the horses are in a low state. One case of redwater was reported last month.

Qumbu.

B. WHITFIELD, ACTG. R.M., 5th July, 1902.—The natives are still busily engaged in reaping their crops of mealies and Kafir corn. The yield this year has been below the average. During the month heavy rain accompanied by very strong and cold wind occurred. About 4.5 inches of rain fell and the upper portion of the district was covered in snow. About 400 head of cattle and 500 horses perished of the cold or in the snow. The pasturage has improved and no disease has been reported amongst the stock.

St. Mark's.

A. GLADWIN, R.M., 3rd July, 1902.—Very heavy westerly winds prevailed in the early part of last month. Heavy cold rains in the second week accompanied by strong south-easterly winds. Deaths amongst stock are reported in the upper parts of the district. Ticks have been bad during this year and mange amongst horses.

Tabankulu.

T. NORTON, R.M., 30th June, 1902.—The usual monotony of these reports has been disturbed in a most unwelcome and unusual way. What has been described, with considerable truth, as a blizzard visited the district early this month and did very great damage to stock. It is difficult to obtain reliable figures as to the losses, but I estimate that between three and four hundred head of cattle and fifteen hundred sheep have been lost in this district. For over twelve hours thunder and lightning were incessant accompanied with floods of rain and wind of terrific force. Between 10 a.m. and 5 a.m. 6½ inches of rain fell on the 10th and 11th. Over fifty trees were blown down in this village, and in the Tabankulu Forest a large number bordering the road have fallen. Our one road, viz., to St. John's, is quite blocked in very many parts owing to landslips, and will require large gangs of men to open it for traffic unless we are to be cut off from our port for months to come.

Tsomo.

HORACE D. LEVY, ACTG. R.M., 30th June, 1902.—During the second week in the month very strong winds prevailed, accompanied by heavy rain, which was intensely cold, causing heavy losses among small stock. The rainfall for the month was 4.48. The country is still looking very dry. In places where the grass has

started to shoot, the heavy frosts which we are having now soon burns it off again. The mealie harvest was not good. Traders are buying the new mealies at about 25s per bag. The Kafir corn harvest was a fair one. One case of lung-sickness was reported during the month, and the infected kraal was promptly placed in quarantine. Stock, considering the time of the year and the state of the pasturage, are in fair condition. Since the last rains the natives have been busy re-ploughing their lands again, sowing now wheat and oats.

Umtata.

A. H. B. STANFORD, R.M., 30th June, 1902.—The month was characterized by a most unusual downpour of rain accompanied by very high wind, which lasted about forty hours, during which 7½ inches of rain fell, resulting in considerable loss of stock, principally in horned cattle, and great damage to forests, parks and plantations. Since then the weather has continued cold with frequent and severe frosts.

Umzimkulu.

E. J. WHINDUS, R.M., 30th June, 1902.—The very severe storm of the 11th and 12th June has caused immense losses to stock-owners. All reports are not yet in from the upper portion of the district, but up to the present I estimate the losses to be about 100 horses, 600 cattle and between 1,500 and 2,000 sheep and goats, but numbers of animals are missing and will not be found until the snow disappears. Such a blizzard has not been experienced since 1868. Great damage has been done to forest trees, orchards and private plantations by the high wind, which at times blew with hurricane force, and in this village alone some hundreds of trees have been blown down. In hollows and drifts snow still lies some 20 ft. deep. The road between this and Kokstad was blocked to traffic by snow for some days, and telegraphic communication was stopped both on the Colony and Natal side. Buck, partridge and hares are found dead in numbers in the Indowana portion of the district. In the lower portion of the district stock of all descriptions are in a good condition considering the season and are free from disease. Mealies and Kafir corn crops are being reaped; the former is by no means a good crop. Grub not only attacked the mealies sown early but also those sown later, an unusual occurrence.

Willowvale

M. LIEFELDT, R.M., 30th June, 1902.—I regret to have to report that in the blizzard which passed over the Territories on the night of Wednesday, 11th instant, one thousand head of cattle, mostly young stock and in good condition, as also some two thousand sheep and goats, perished from cold; while the rush of water (seven inches of rain having fallen) deluged and carried away the standing crops, burying in mud a large proportion of the unharvested grain. Previous to the rain the country had been very dry, but already Spring has set in, and there is every prospect that the surviving stock will soon be in excellent condition.

Artificial Manures.

The annexed list showing the agents from whom the various artificial manures may be obtained, and the current prices, is published for the information and guidance of agriculturists.

Full particulars as to the composition of the respective fertilizers can be obtained on application to the agents; and attention is also invited to the analyses published in the *Agricultural Journal* of 9th January, 2nd April and 11th June, 1896; 30th Sept., 1897; 27th Oct., 1898; 13th April, 6th July, 1899 and 18th July, 1901.

LIST OF FERTILIZERS.

Attwell & Co., Cape Town. (Agents for Alex. Cross & Sons, Ltd., Glasgow.)	Special Root Guano	..	£6	10	0	per ton of 2,000 lb.
	Potato and Grain Guano	..	8	5	0	" "
	Nitrate of Soda	..	12	0	0	" "
	Superphosphates 39/40 per cent	..	6	0	0	" "
	Scotia Basic Slag (cont. 30 per cent. Tribasic Phosphate of Lime)	..	4	15	0	" "
	Sulphate of Ammonia	..	0	19	6	per 100 lb. "
(Prices free on trucks, Cape Town)						
Jas. Searight & Co., Cape Town.	No. 1 Superphosphates	..	£5	0	0	per ton of 2,000 lb.
	(containing 12·14 per cent. Phosphoric Acid soluble in water, being equal to 26·30 per cent. Tribasic Phosphate of Lime).	..				
Jas. Searight & Co., Cape Town.	No. 2 Superphosphates	..	5	10	0	" "
	(containing 14·16 per cent. Phosphoric Acid soluble in water, being equal to 30·35 per cent. Tribasic Phosphate of Lime).	..				
	No. 3 Superphosphates	..	£6	0	0	per ton of 2,000 lb.
	(containing 17·18 per cent. Phosphoric Acid soluble in water, being equal to 37·39 per cent. Tribasic Phosphate of Lime).	..				
	Vine Fertilizers	..	9	0	0	" "

A reduction of 5s. per 2,000 lbs. is allowed on orders of 100 bags or more. Special rates can be arranged if delivery is taken ex importing steamer, the goods being trucked at Docks.

Woodhead, Plant & Co. Cape Town.	Thomas' Phosphate Powder	..	£4	15	0	per ton of 2,000 lb.
	Superphosphates	..	5	15	0	
	Nitrate of Soda	..	14	0	0	
	Muriate of Potash	..	16	0	0	
	Sulphate of Potash	..	16	0	0	
	Wheat Fertilizer	..	8	10	0	
	Kainit	..	4	15	0	
	Potato	..	1	15	0	per 200 lb.
	Vineyard Manure	..	1	15	0	" "
	Tobacco Manure	..	1	15	0	" "
	Sulphate of Ammonia	..	1	2	6	per 100 lb.
Subject to a discount for cash.						

De Waal & Co., Cape Town.	Jadoo Fibre	10s.] 6d.	per bale of 100 lb.
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White Ryan & Co., Cape Town.	Potato, Vegetable and General garden	£8 10s. per ton of 2,000 lb. If less than $\frac{1}{2}$ ton 18s. 6d. per bag of 200 lb.
	Pure Ground Bone	£6 10s. per ton of 2,000 lb. If less than $\frac{1}{2}$ ton 13s. 6d. per bag of 200 lb.
White, Ryan & Co., Cape Town.	Quick-acting Bone and Potash Mixture	£7 per ton of 2,000 lb. If less than $\frac{1}{2}$ ton 16s. per bag of 200 lb.
	Selected Bone Meal for Cattle, Horses, Pigs and Poultry ..	15s. 6d. per 100 lb.; special price per ton.
	Bone Grit for Fowls	12s. 6d. per 100 lb.
	Superphosphates	Wholesale only.
Malcomess & Co., E. London.	"Malcomess" A. Fertilizer, for Potatoes, Mealies, Vegetables, Orange and other trees ..	£9 per ton of 2,000 lb.
	"Malcomess" B. Fertilizer, for cereals, especially wheat ..	£9 per ton of 2,000 lb.
	Accompanied by guaranteed analysis by Prof. Hahn ..	(less 5 per cent for cash).
James Flower & Sons, Cape Town.	"H.B.T." Gypsum	£3 10s. per ton of 2,000 lb.
	Pure Ground Bone Meal ..	£8 10s. (in bags f.o. trucks—Cape Town).
Government Guano :—	Ordinary Guano	£6 10s. per ton of 2,000 lb. or 13s. per bag of 200 lb.
	Rock Guano	£6 17s. per ton of 2,000 lb. or 13s. 9d. per bag of 200 lb.

For use within limits of Colony.

Price includes delivery at Cape Town Railway Station.

D. E. Hockly & Co., East London.	"Hockly's Special Fertilizer." }	£9 per ton of 2,000 lb. less 5 per cent for cash. Special Price.
	A complete manure for all crops }	
	Pure Bone Meal	
J. G. Staytler & Co., Cape Town.	Phosphates or Basic Slag	£4 2 6 per ton of 10 bags each 200 lb.
	Superphosphates ..	4 12 6
	Dissolved Bone ..	6 7 6
	Grain Fertilizer ..	7 0 0
	Potato Fertilizer ..	8 0 0
	Vine Fertilizer ..	8 0 0
Henry Ries & Co. East London.	Agents for the Lawes Chemical Manure Co., Ltd., of 59, Mark Lane, London, who prepare fertilizers for them, which they sell at the undermentioned rates :—	
	Ries' Potato Fertilizer ..	15s. to 17s. 6d. per bag of 200 lb.
	„ Special Dissolved Bone ..	8s. 6d. to 10s. „ of 100 lb.
	„ Special Cereals Manure ..	8s. 6d. to 10s. „ of „
	„ Ordinary ..	7s. 6d. to 9s. „ of „

For the potato fertilizer they make a reduction of 1s. 6d. per bag on orders for 10 to 25 bags, 2s. on orders for 30 to 50 bags, and 2s. 6d. on orders for 50 to 100 bags. For the other three lines they make reductions of 6d., 1s. and 1s. 6d. per bag respectively on orders for 10 to 25, 30 to 50, and 50 to 100 bags. Analysis guaranteed as per list.

The Produce Market.

CAPE TOWN.

Messrs. Wm. Spilhaus and Co. report under Saturday's date, Aug. 2, as follows:—

Ostrich Feathers.—Since our last the results of the London sales are now to hand. Superior whites, feminas, spadonas, long and medium blacks and drabs and floss were higher, whereas inferior wings and boos generally suffered a decline in values.

From actual results received of the goods sold, shippers have not done so well compared with prices ruling here of late. Sellers preferring to await the above news, we have no market to report upon this week. Our quotations are nominal.

					£	s.	d.	£	s.	d.
Whites (primes) ..	..	..	..	..	10	10	0	14	0	0
Firsts ..	..	..	..	..	7	10	0	10	0	0
Seconds ..	..	..	..	..	5	10	0	6	10	0
Thirds ..	..	..	..	..	4	0	0	4	10	0
Inferior and stalky ..	..	..	..	..	1	15	0	2	5	0
Boocks ..	..	..	..	..	4	10	0	6	0	0
Feminas (super) ..	..	..	..	..	6	0	0	8	0	0
Firsts ..	..	..	..	..	4	10	0	5	10	0
Seconds ..	..	..	..	..	3	0	0	4	0	0
Thirds ..	..	..	..	..	2	0	0	2	10	0
Inferior ..	..	..	..	..	0	15	0	1	0	0
Dark ..	..	..	..	..	3	10	0	5	0	0
Spadonas (White) ..	..	..	..	..	1	10	0	2	0	0
Light and Dark ..	..	..	..	..	0	10	0	1	0	0
Boos (White) ..	..	..	..	..	1	0	0	1	5	0
Light ..	..	..	..	..	0	17	6	1	2	6
Black Butts ..	..	..	..	..	0	7	6	0	10	0
Dark ..	..	..	..	..	0	7	6	0	10	0
Inferior ..	..	..	..	..	0	3	0	0	5	0
Blacks (Long) ..	..	..	..	..	4	0	0	4	10	0
Long Medium ..	..	..	..	..	2	0	0	3	0	0
Medium ..	..	..	..	..	1	0	0	1	10	0
Short ..	..	..	..	..	0	5	0	0	10	0
Long Floss ..	..	..	..	..	1	5	0	1	10	0
Medium Floss ..	..	..	..	..	0	7	6	0	10	0
Short Floss ..	..	..	..	..	0	2	6	0	5	0
Drabs (Long) ..	..	..	..	..	2	0	0	3	0	0
Long Medium ..	..	..	..	..	1	5	0	1	10	0
Medium ..	..	..	..	..	0	10	0	1	0	0
Short ..	..	..	..	..	0	2	0	0	4	0
Long Floss ..	..	..	..	..	1	5	0	1	10	0
Medium ..	..	..	..	..	0	5	0	0	10	0
Short ..	..	..	..	..	0	2	0	0	3	0
Inferior Long Blacks and Drabs ..	..	..	..	..	0	15	0	1	0	0
Floss ..	..	..	..	..	0	4	0	0	5	0
Wiry ..	..	..	..	..	0	0	6	0	0	6
Chicks ..	..	..	..	..	0	0	6	0	1	0

Wools.—From cable news received we learn that the London sales closed firm with good competition. Only one small sale has taken place here during the week. The lots offered were irregular, and we have no change to report. We quote:—Karoo grease for scouring, 4½d. to 5½d. per lb.; Karoo grease for combing, 5½d. to 6½d. per lb.; snow-whites, ordinary, 1s. 1d. to 1s. 2d. per lb.; superior snow-whites, 1s. 2½d. to 1s. 4d. per lb.; extra snow-whites, 1s. 4½d. to 1s. 5½d. per lb.

Wools unaltered.—We quote:—Merino long wools, 5d. to 5½d. per lb.; short wools, 4½d. to 4¾d. per lb.; damaged and pelts, 8½d. per lb.; bastards, 3½d.; Capes, sound, 1s. 3d. each; cut, 1s.; damaged, 6d.; goatskins, 10d. per lb.; sundried, 6d. per lb.; scurvy, 6d. each; other descriptions according to quality.

GOVERNMENT NOTICES.

Cape Government Railways.

ADMISSION OF APPRENTICES INTO THE LOCOMOTIVE DEPARTMENT.

There are vacancies for Apprentices in the following Branches of the Locomotive Workshops at Salt River, viz.:

Boiler Shop	Three boys for heating rivets and cleaning Boilers, to learn the trade of a Boilermaker.
Carriage Shop	Two boys, to learn the trade of a Sawyer.
Carriage Shop	One boy, to learn the trade of a Carriage Fitter.
Carriage Shop	Two boys, to learn the trade of a Coach Builder.
Carriage Shop	Two boys, to learn the trade of a Coach Painter.
Blacksmith Shop	One boy, to work steam hammer;

and applications from youths between the ages of 14 and 16 are invited for filling the vacancies.

Applicants must have passed the 5th Standard, and will be required to produce a certificate to that effect, and also certificates as to character.

Applicants who are able to produce proofs of having satisfactorily passed a higher standard of education will receive the preference in filling the vacancies, other things being equal.

The rate of pay to commence with will be 2d. per hour.

Applications should be sent to the Chief Locomotive Superintendent or Locomotive Superintendent, Salt River, from whom any further particulars can be obtained.

Office of the General Manager of Railways, Cape Town, T. R. PRICE,
8th March, 1902. General Manager.

Farmers' Apprentices. Dairy Assistants, &c.

As inquiries are from time to time received from young men from abroad as to where they may serve apprenticeship or gain practical experience of farming in this Colony, before starting on their own account, the Secretary for Agriculture invites Farmers who are willing to receive young men of good character, for this purpose, to register their names with the Under Secretary for Agriculture, stating the class of farming they do, how many young men they are prepared to take, and for what period they would enter into an agreement.

It is not probable that these young men will be in a position to give more than their free services in return for the experience they will gain; that is, they will not be able to pay any fee; and they will look to receiving free board and lodging in return for their services.

It is to Farmers, therefore, who are willing to grant such young men free board and lodging in return for services rendered, that this application is especially addressed.

With reference to the above notice to Farmers, the Secretary for Agriculture now invites young men who are willing to engage themselves as Farmers' Apprentices in Cape Colony to register their names with the Under Secretary for Agriculture, Cape Town. The apprentice will gain experience in farming in South Africa, and have an opportunity for spying out the land before starting on his own farm. To the new comer from another country this is essential, for he has much to learn and unlearn.

Many applications for such Apprentices have been received from Farmers in the Colony. It will be noted that the Apprentice will neither receive wages, nor pay a fee. He will get free board and lodging in return for his services, and at the same time acquire the experience he is in need of.

Applications for employment have also been received from several Lady Dairy Experts and Dairy Assistants; and Dairy Farmers and others desiring to avail themselves of the services of such are invited to register their names with this Department, giving particulars as to situation and extent of operations, etc. and salary and other emoluments they are prepared to offer.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM BASUTOLAND.

By command of His Excellency the Governor the following Proclamation No. 63, 1902, was published in the *Government Gazette* of April 22nd, 1902:—

Under and by virtue of the powers vested in me by the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," and the Act No. 2 of 1897, entitled the "Animal Diseases Rinderpest Amendment Act, 1897," I do hereby proclaim, declare and make known that, whereas the disease known as Rinderpest is prevalent amongst cattle in Basutoland, it shall not be lawful, from and after the date hereof, to introduce or to cause or allow Horned Cattle to be introduced from Basutoland into any part of this Colony, save and except cattle in yoke and accompanied by a certificate, to be obtained and held by the person in charge of such cattle, signed by a competent and responsible officer, to the effect that such cattle are free from infectious or contagious disease and have not been in contact with infected animals or come from a locality where any such disease shall be known to exist.

And I do hereby proclaim and make known that all Horned Cattle which may enter this Colony in contravention of this Proclamation shall be liable to be destroyed.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM ORANGE RIVER COLONY AND THE TRANSVAAL.

By command of His Excellency the Governor, the following Proclamation No. 139 1901, was published in the *Government Gazette* of August 16th, 1901:—

Under and by virtue of the powers vested in me by the "Animal Diseases Act," No. 27 of 1893, and by the "Animals Diseases Rinderpest Amendment Act," No. 2 of 1897, I do hereby proclaim, declare and make known that it shall not be lawful, from and after the date hereof, to introduce or to cause or allow Horned Cattle to be introduced into any part of this Colony from the Orange River Colony and the Transvaal, save and except such cattle as may be required to be introduced by the Government for the purpose of supplying Bile or Serum for inoculation against Rinderpest:

And I do hereby proclaim and make known that all Horned Cattle which may enter this Colony in contravention of this Proclamation shall be liable to be destroyed

And I do hereby further declare that this Proclamation shall have effect from and after the date hereof, and shall continue in force until amended or repealed.

Proclamation No. 217, bearing date the 29th day of October, 1900, together with the regulations issued thereunder, is thereby repealed.

And I do strictly charge every Resident Magistrate, Field-cornet and Justice of the Peace to see that this Proclamation is obeyed, and to bring to justice any person who may contravene the same.

Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined Regulation for checking the spread of the infection is republished.

REGULATION ISSUED UNDER PROCLAMATION No. 30, DATED 20TH JANUARY, 1899.

Whenever under the provisions of Sections 11 and 12 of Act No. 27 of 1893, any area is declared or proclaimed to be an area infected with Rinderpest, it shall not be lawful for any person, animal, animal produce, article or thing, who or which may, in the opinion of the Magistrate of the District in which such area is situated, be liable to convey infection of Rinderpest, to leave or to be removed therefrom.

Inoculation Against Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of the Colony, it is desirable to inform stock-owners of the intentions of the Government as to dealing with the outbreak should it unfortunately become general in the Colony, and to advise stock-owners as to the best course to follow.

The Government propose that, as a general rule, cattle-owners themselves should perform the inoculation. Glycerinated Bile will be used, though circumstances may arise where it will be preferable to use Serum.

Bile Stations will be established in suitable places as necessity arises in localities where farmers have agreed to contribute the required proportion, say 5 per cent., of their cattle for production of the bile. It must be clearly understood that unless farmers are prepared to thus contribute the necessary cattle, it will be impossible for them to have the benefit of a Bile Station.

Glycerinated Bile will be issued free to contributors in proportion to the number of cattle contributed to a Bile Station. To non-contributors a fair charge will be made for bile if any be available for issue.

Serum will be charged for at the rate of £1 per bottle of ten doses.

A limited supply of Glycerinated Bile to meet emergencies will, for a time, be available, free of charge, from the Bile Station which has been established under arrangements with the Imperial Military authorities near Aliwal North.

As occasion requires, Demonstrators will be sent to instruct farmers in the method of inoculation, free of charge. They will, as a rule, inoculate only enough cattle to show how it is to be done, leaving the owner to continue the work. The Government will supply syringes on application to the Resident Magistrate, or to the Demonstrators at the following charges:—20 cc. capacity, 20s; 10 cc. capacity, 15s. This payment may be recovered on return of the syringe to the Magistrate, in good order.

After the experience gained during the outbreak of 1896-1898, the Colonial Veterinary Surgeon wrote* as follows:—

"The method of inoculation which I would recommend in future sporadic outbreaks of the disease is briefly as follows:—

"*Infected Herds.*—These should be inoculated at once with either serum or glycerinated bile; every animal which indicates infection by a rise of temperature should receive a large dose of not less than 100 cc. of serum, or 30 cc. of glycerinated bile; the latter should, by preference, be injected into the jugular vein, so as to secure its immediate action. Then from eight to twelve days after, all the animals in the herd which give no indication of being infected with the disease, or fever temperature should receive an injection of pure bile; not less than 10 cc., and for large animals 20 cc. This will confer a lasting immunity sufficient for all practical purposes.

"*Clean Herds.*—When it is decided to inoculate a clean herd, which is in danger of becoming infected through its proximity to diseased cattle I would recommend that the animals composing the herd should be inoculated first with 20 cc. of glycerinated bile, and to follow this inoculation in from eight to twelve days with an injection of from 10 to 20 cc. of pure bile. This will confer a strong and lasting immunity on the animals in the herd, and will be free from risk arising from the inoculation or of introducing the disease.

"*Use of Pure Bile.*—Pure fresh bile should not be used in an infected herd, if any of the other inoculating materials can be obtained, as it tends to intensify the character of the disease in those already infected, and its immunising effect is too slowly developed to protect the healthy cattle against infection, if they are left in contact with those already sick. If no other means are available, however, the temperatures of the whole of the cattle in the infected herd should be carefully taken by the clinical thermometer, and only those which register a normal temperature should be inoculated with pure bile, the others should be separated from the inoculated lot at once, and carefully tended. If glycerine can be obtained, the spare bile should be mixed with it in the proper proportions—one part of glycerine to two parts of bile. This mixture, after standing forty-eight hours, may be injected into the affected animals in large doses, not only with safety, but with marked benefit.

"*Preparing the Bile.*—The bile should be taken from an affected animal immediately after death, or from one which is killed in the last stage of collapse.

* See *Agricultural Journal*, June 8, 1899, in which will be found a full consideration of the different methods of inoculation.

"Biles of all shades of colour—except those which are red from the presence of blood—may be used, so long as they are clear and free from a putrid smell. Thin light yellow biles should also be rejected.

"All the galls extracted at one time should be mixed together, after standing separately for twelve to eighteen hours, so as to render them uniform in strength and immunising properties. Pure bile should be used on the second day after being drawn, unless it is kept in an ice chest, when it may be kept sweet much longer. But if pure bile is used as a second inoculation only, as above directed, it is not desirable to keep it longer than twenty-four hours.

"Glycerinated bile is made by adding one part of glycerine to two parts of bile, stir the mixture well, then mix all the biles taken at one time, and allow them to stand for eight days. But if there is urgency, the glycerinated bile may be used forty-eight hours after it is mixed.

"I would strongly recommend that in every outbreak of the disease that occurs, every drop of suitable bile, obtained from the animals which die, should be mixed with glycerine in proper proportions, two parts of the bile to one of glycerine, so that it may be preserved and made available for the inoculation of infected herds, and also for the first inoculation of clean herds which may be considered in danger. Pure bile for the second inoculation of clean herds can always be obtained when the disease appears in any locality, which would be the only reason for inoculating clean herds in the immediate vicinity."

Taking the Bile.—To remove the bile the animal must be laid on its left side, the skin and flesh on the right side immediately behind the last rib being cut through; the ribs being raised, the gall bladder will become visible. The gall bladder should be then punctured with a small knife and the gall allowed to escape into a wide-mouthed bottle. If wide-mouthed bottles are not available then ordinary whisky bottles may be used with an *enamelled* funnel, which can be procured at any country store. Every precaution must be taken that the operation is performed in a thoroughly clean manner, the hands of the operator and all knives, &c., being thoroughly cleansed before use.

Inoculating.—After having secured the animal to be operated upon, the necessary dose of bile is injected under the skin of the dewlap by means of a Hypodermic Syringe, care being taken that the point of the needle is not inserted into the flesh, but between the skin and flesh.

Symptoms of Rinderpest.

The Outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined description of the symptoms of Rinderpest is hereby published:—

The early symptoms of Rinderpest are a rise of internal temperature to 106 or 107° Fahr.; the animal stands with its head hanging down, ears drawn back and coat staring; it refuses all food and occasionally shivers. A mucous discharge flows from the eyes and nostrils; the extremities are cold, and the breathing is laboured and frequently accompanied with moaning. The inner part of the upper lip and roof of the mouth and all visible mucous membranes are reddened, and covered with an eruption of minute pimples, and later with a branlike exudation. The bowels are occasionally constipated, but in most cases diarrhoea sets in, the evacuations being slimy and very frequently of a dirty yellow colour. The prostration of strength is great, the animal staggering when made to move. In milch cows the secretion of milk is rapidly diminished, and soon ceases altogether. The disease usually ends fatally in from six to ten days.

It is generally believed that the infection is produced through the respiratory organs; from there the contagion becomes generalised. The contagion exists in the secretions and excretions, urine, saliva, mucous secretions of the nose, mouth and eyes, in the sweat, expired air, blood, and in all the tissues. It may be conveyed directly by the diseased animals, or indirectly by the dung, the bedding, the earth, hides, wool, meat, clothing, wagons or vessels, by people, dogs, sheep and chickens, &c. Contagion takes place only through short distances. When the weather is dry this is reduced to its minimum (about 27 yards), and the progress of the disease may be stopped by a ditch separating the diseased from the healthy animals.

In order to detect the earliest symptoms of Rinderpest, owners of horned cattle are warned of the urgent necessity for keeping a constant and close watch upon their stock. Any suspicious cases should be immediately reported to the nearest Resident Magistrate,

Field-cornet or Police Officer, and the sick animal kept separate till an inspection is made. Stock should be carefully examined daily by a responsible person, more particularly for any symptoms resembling those above described.

Locust Disease Fungus.

The attention of landowners and others is drawn to the provisions of Government Notice No. 1128 of 1897, wherein it is notified for general information that supplies of Locust Disease Fungus may be obtained from the Director of the Bacteriological Institute, Graham's Town, at a cost of sixpence per tube to all applicants residing in the Colony. Applicants beyond the borders of the Colony are required to pay the cost of postage in addition to the amount charged.

As the Fungus is cultivated on a moist jelly and is therefore liable to become dried up and useless if kept long on hand, it is not found possible to store supplies in the various districts of the Colony; and applicants desirous of trying the Fungus should therefore submit their applications, with a remittance for the quantity applied for, *direct* to the Director, who can always supply the Fungus in proper condition and on short notice.

Lung-Sickness.

INTRODUCTION OF CATTLE FROM OVER THE ORANGE RIVER.

By command of His Excellency the Governor, the following Proclamation was published in the *Government Gazette* of the 30th October, 1900:—

Whereas by virtue of the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," it is enacted that it shall be lawful for the Governor by Proclamation in the *Gazette*, to prohibit the importation or introduction into this Colony from any place beyond the same in which any infectious or contagious disease affecting animals shall be known or be supposed to be prevalent, of any such animals as in such Proclamation shall be mentioned

And whereas the disease known as Lung-sickness (Pleuro-pneumonia) is prevalent amongst cattle in the Transvaal and the Orange River Colony:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of Cattle from the Transvaal and the Orange River Colony, save by road by way of Aliwal North, Bethulie Bridge or Norval's Pont, and subject to the regulations set forth in the Schedule hereto, shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Schedule to the foregoing Proclamation.

(1) No cattle shall be introduced into this Colony from the Transvaal or the Orange River Colony by railway.

(2) No cattle shall be introduced into this Colony from the Transvaal and the Orange River Colony by road,

(a) Unless the person in charge of such cattle shall have obtained and have in his possession a certificate with regard to such cattle, in the form set forth in Schedule A hereto, signed by a competent and responsible officer or person delegated for this purpose by the Government of the Transvaal or the Orange River Colony, and

(b) Unless such certificate shall have been countersigned or endorsed by the Inspector appointed for this purpose by the Colonial Government at Aliwal North, Bethulie Bridge, or Norval's Pont.

(3) No person intending to introduce cattle from the Transvaal or the Orange River Colony, shall be permitted to introduce such cattle unless he shall have obtained the aforesaid endorsement, and he shall, with that view, give timely notice to the Inspector, stating the number of cattle and the place, within 8 miles of Aliwal North, Bethulie Bridge and Norval's Pont, where the cattle may be inspected, and the proposed time of introduction; and upon receipt of such notice the Inspector shall proceed at the time and to the place specified in such notice, or as soon thereafter as may be possible, then and there to examine such cattle.

(4) The person in charge of such cattle shall be bound to produce the certificate aforesaid to the Inspector, and such Inspector shall, if the certificate be in order, and the cattle be free from disease, make an endorsement on the certificate in the form given in Schedule "B" hereto, and the cattle may thereafter proceed on their way. The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, duly endorsed, to any Field-Cornet, Police Officer or owner of land over which the cattle may pass or be passing.

(5) In the absence of the Certificate prescribed in regulation (2) the cattle shall be quarantined for a period not less than twenty-one days at some place on the north bank of the Orange River and in the neighbourhood of Aliwal North, Bethulie Bridge and Norval's Pont where they may be inspected by an Officer of the Colonial Government, appointed for the purpose, at such intervals as may be considered necessary.

(6) On the expiration of the period of quarantine the Inspector, should he be satisfied that the cattle are free from disease, shall issue a Certificate in the form set forth in Schedule C hereto.

(7) The person in charge of such cattle as are referred to in the Certificate mentioned in regulation (6) is liable to be called upon to produce such Certificate to any Field-Cornet, Police Officer or owner of land over which such cattle may pass or be passing.

(8) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for any period not exceeding three months unless such fine be sooner paid.

SCHEDULE A.

I hereby certify that the undermentioned Cattle either have not mixed with and Cattle affected with Lung-sickness and are free from disease; or have been effectively inoculated against Lung-sickness and are free from disease, viz:—

Number and general description of Cattle	.....
Owner's name and address	.....
In charge of.....	.....
Place to which Cattle are being sent.....	.....
(Signature).....	.....
(Address).....	.....

Date.....

SCHEDULE B.

(Endorsement to be made by the Inspector.)

I hereby certify that I have examined the Cattle to which this Certificate refers and find them to be free from disease.

(Inspector's Signature).....	.....
(Address).....	.....
Date.....	.....

SCHEDULE C.

I hereby certify that the Cattle to which this Certificate refers have undergone a period of quarantine for at least twenty-one days, that I have examined them and find them to be free from disease, viz:—

Number and general description of Cattle	.....
Owner's name and address	.....
In charge of.....	.....
Place to which Cattle are being sent.....	.....
(Inspector's signature).....	.....
(Address).....	.....
Date.....	.....

Rewards for Destruction of Vermin.

By command of His Excellency the Governor, the following Government Notice was published in the *Government Gazette* of the 16th November, 1900:—

DESTRUCTION OF WILD CARNIVORA.

1. The animals for which rewards will be paid and the rates of payment will be as follows:—

		s.	d.
For a Lynx or Red Cat (<i>Felis caracal</i>)	3 6
For a Red Jackal (<i>Canis mesomelas</i>)	5 0
For a Silver or Side-striped Jackal (<i>Canis adustus</i>)	5 0
For a Maanhaar Jackal (<i>Proteles cristatus</i>)	3 0
For the young or pups of the above Jackals, under three months old, for which whole skins, including tail and scalp, must be produced	1 0
For a Baboon (<i>Papio porcarius</i>)	1 3

2. Payment will be made on the first and third Monday in each month, at the Office of the Resident Magistrate or Assistant Resident Magistrate of the District within which the animals have been destroyed.

3. Applicants for rewards under these regulations must, when applying for the payment, produce

- (a) For full-grown animals the complete tail and scalp including the ears. For the young of Jackals, whether Red, Silver or Maanhaar, the whole skin including tail and scalp.
- (b) A Declaration signed by a Landowner, Justice of the Peace or Field-cornet residing in the District, stating that the animals (specifying the number of each kind) for which the rewards are claimed have been destroyed within the boundaries of the District.

Netting for Fruit Trees.

The Board of Horticulture, Western Province, has decided to again import, in time for next fruit season, a supply of Bird and Fly Netting. The Bird Netting will, like last year, be made to order in pieces of about 180 feet long and 18 feet wide, and its cost will be about 15s. per piece. The Fly Netting will be mosquito netting of the same kind as has been imported on previous occasions. The cost will probably be the same as before, from 7s. to 8s. per piece 120 feet long by 70 inches wide.

Applications should be addressed to the Secretary, Board of Horticulture, Stellenbosch. All applications must be in the hands of the Secretary not later than the 31st July. On arrival of the nettings, applicants will be notified of the amounts respectively due, and on receipt of remittance the nettings will be forwarded.

C. MAXER, Secretary.

Western Province Board of Horticulture,
Stellenbosch, 9th June, 1902.

Salt Bush Seed.

The Department of Agriculture has now received a limited quantity of Salt Bush Seed, which will be disposed of at the rate of 4d. per lb. exclusive of railage. Applications should be addressed to the Under Secretary for Agriculture.

RAINFALL, JUNE, 1902.

NOTE: n.r. denotes that, up to the date of publication, Returns have *not* been received from those Stations.

I. CAPE PENINSULA:		INCHES	II. SOUTH-WEST—continued.		INCHES
Royal Observatory, 12 inch gauge	..	4 64	Lady Grey (Div. Robertson)	..	0 31
Cape Town	..	5 93	Robertson	..	0 98
Do. S. A. College	..	9 05	Do. (Govt. Plantation)	..	0 89
Do. Sea Point (Falmouth Villa)	..	4 81	Montagu	..	n.r.
Do. Molteno Reservoir	..	9 53	De Hoop (Div. Robertson)	..	1 58
Do. Platteklip	..	13 27	Piquetberg Road	..	3 00
Do. Signal Hill	..	4 06	Vygebooms River	..	2 44
Table Mountain, Disa Head	..	8 04	Danger Point	..	5 73
Do. Kasteel's Poort	..	22 33	III. WEST COAST:		
Do. Waai Kopje	..	18 10	Port Nolloth	..	n.r.
Do. St. Michael's	..	24 53	Do. (Howard)	..	n.r.
Devil's Peak, Block House	..	19 58	Klipfontein	..	n.r.
Do. Nursery Gauge	..	14 94	Kraaifontein	..	n.r.
Do. Lower Gauge	..	12 72	O'okiep	..	n.r.
Rondebosch	..	n.r.	Springbokfontein (Gaal)	..	n.r.
Newlands (Montebello)	..	24 39	Concordia	..	n.r.
Bishopscourt	..	13 66	Garies	..	n.r.
Claremont	..	n.r.	Kersefontein	..	1 27
Kenilworth	..	13 51	The Towers	..	2 92
Wynberg (St. Mary's)	..	8 92	Dassen Island	..	2 17
Brook Constantia	..	13 05	Malmesbury	..	1 85
Tokai	..	n.r.	Piquetberg	..	2 03
Simon's Town (Wood)	..	9 56	Van Rhyndorp	..	n.r.
Do. (Gaal)	..	9 71	Clanwilliam (Gaal)	..	n.r.
Blaauwberg Strand	..	2 62	Do. (Seydell)	..	0 46
Robben Island	..	3 34	Welbedacht	..	n.r.
Strandfontein	..	3 80	Hopsfield	..	1 43
Camp's Bay	..	5 22	Lilyfontein	..	n.r.
Fish Hoek	..	4 56	Wupperthal	..	0 25
Cape Point	..	2 96	Zoutpan	..	2 11
Smith's Farm, Cape Point	..	8 63	IV. SOUTH COAST:		
Durbanville	..	4 01	Cape L'Agulhas	..	5 89
II. SOUTH-WEST:			Bredasdorp	..	3 73
Eerste River	..	3 61	Swellendam	..	2 00
Klapmuts	..	4 33	Heidelberg	..	0 84
Stellenbosch (Gaal)	..	4 42	Riversdale	..	1 06
Somerset West	..	3 65	Dumbie Dykes	..	1 57
Paarl	..	5 52	Mossel Bay	..	2 03
Wellington (Gaal)	..	4 49	George	..	2 02
Do. (Huguenot Seminary)	..	2 77	Ezelzagt	..	..
Tulbagh	..	1 73	Millwood	..	2 92
Kluitjes Kraal	..	3 02	Sour Flats	..	2 05
Ceres	..	2 74	Concordia	..	4 39
Ceres Road	..	1 21	Knysna	..	3 95
Rocklands	..	0 72	Buffels Nek	..	3 26
Caledon	..	3 65	Harkerville	..	3 51
Do. (Guthrie)	..	3 27	Plettenberg Bay	..	n.r.
Worcester (Gaal)	..	0 60	Forest Hall	..	n.r.
Do. (Meiring)	..	n.r.	Blaauwkrantz	..	3 63
Do. (Station)	..	1 00	Storm's River	..	4 14
Hex River	..	0 16	Witte Els Bosch	..	4 10
			Humansdorp	..	n.r.

IV. SOUTH COAST— <i>continued</i> .	INCHES.
Cape St. Francis ..	5.17
Hankey ..	1.77
Witteklip ..	3.23
Van Staaden's (upper) ..	1.98
Do. (lower) ..	2.03
Uitenhage ..	1.39
Do. (Inggs) ..	1.31
Do. (Park) ..	1.49
Dunbrody ..	1.22
Port Elizabeth (Harbour) ..	2.30
Do. (Victoria Park) ..	2.79
Walmer Heights (near Port ..	
Elizabeth) ..	3.74
Tankatara ..	1.64
Lottering ..	3.70
Shark's River (Nursery) ..	2.79
Do (Convict Station) ..	4.27
Grootvader's Bosch ..	n.r.
Karmmelks River ..	3.61
Centlivres ..	1.63
Kruis River (Uitenhage) ..	0.93

V. SOUTHERN KARROO:

Touws River (D. E.'s Office) ..	0.85
Do. (Station) ..	2.03
Ladismith ..	1.95
Amalienstein ..	0.66
Calitzdorp ..	0.55
Oudtshoorn ..	0.60
Vlakte Plaats ..	n.r.
Unionsdale ..	0.93
Kleinpoort ..	n.r.
Glencorner ..	n.r.
Pietermeintjes ..	1.00
Grootfontein ..	0.00
Verkeerde Vlei ..	1.27

VI. WEST CENTRAL KARROO:

Matjesfontein ..	0.40
Fraserburg Road ..	n.r.
Prince Albert ..	0.05
Do. Road ..	0.00
Zwartberg Pass ..	2.20
Beaufort West ..	0.00
Dunedin ..	n.r.
Nel's Poort ..	0.61
Camfer's Kraal ..	n.r.
Lower Nel's Poort ..	n.r.
Baaken's Rug ..	n.r.
Willowmore ..	0.20
Steytlerville ..	0.50
Roosplaats ..	0.00
Laingsburg ..	0.00

VII. EAST CENTRAL KARROO:

Aberdeen (Gael) ..	0.55
Do. (Bedford) ..	n.r.
Aberdeen Road ..	n.r.
Rietfontein ..	0.13
Winterhoek ..	n.r.
Klipdrift (De Erf) ..	
Kendrew ..	0.61

VII. E. C. KARROO— <i>continued</i> .	INCHES
Graaff-Reinet ..	1.42
Do. (College) ..	1.35
New Bethesda ..	1.67
Rodeo Bloem ..	n.r.
Wellwood ..	n.r.
Do. Mountain ..	n.r.
Jansenville ..	0.57
Patryfontein ..	n.r.
Toegedacht ..	0.50
Klipfontein ..	0.89
Cranemere ..	n.r.
Pearston ..	1.06
Walsingham ..	1.29
Somerset East ..	2.34
Do. (College) ..	2.37
Longhope ..	n.r.
Middleton ..	n.r.
Cornvale (Div. Aberdeen) ..	n.r.
Cookhouse ..	n.r.
Doornbosch, Zwagershoek ..	n.r.
Middelwater ..	1.17
Darlington ..	n.r.
Bloemhof ..	0.73
Arundale ..	1.25

VIII. NORTHERN KARROO:

Calvinia ..	n.r.
Middlepost ..	n.r.
Sutherland ..	1.17
Rhebokfontein ..	n.r.
Fraserburg ..	n.r.
Onderste Doorns ..	n.r.
Droogfontein ..	n.r.
Gannapan ..	n.r.
Carnarvon ..	0.00
Wagenaar's Kraal ..	0.37
Brakfontein ..	n.r.
Vogelstruisfontein ..	n.r.
Victoria West ..	0.03
Britstown ..	0.35
Murraysburg ..	n.r.
De Kruis ..	n.r.
Richmond ..	n.r.
De Aar ..	0.67
Middlemount ..	n.r.
Hanover ..	2.15
Philip's Town ..	0.86
Boschfontein ..	0.55
Petrusville ..	n.r.
The Willows ..	n.r.
Naauwpoort ..	0.67
Middelburg ..	1.30
Colesberg ..	n.r.
Tafelberg Hall ..	1.57
Rietbult (Colesberg Bridge) ..	1.00
Stonehills ..	1.14
Craddock ..	0.79
Do. (Rose) ..	0.80
Varsch Vlei ..	n.r.
Witmoos ..	2.11
Steynsburg ..	1.13
Do. (Nesemann) ..	1.09
Daggaboer's Nek ..	n.r.
Springfield ..	n.r.

VIII. N. KARROO—continued.

	INCHES.
Quagga's Kerk ..	n.r.
Tarkastad ..	1-56
Drummond Park ..	2-00
Riet Vlei ..	1-12
Brand Vlei ..	n.r.
Williston ..	n.r.
Omdraai's Vlei ..	n.r.
Zwagersfontein ..	n.r.
Varken's Kop ..	1-74
Culmstock ..	n.r.
Doorskuilen ..	n.r.
Houwater Dam ..	n.r.
Hillmoor ..	0-36
Glen Roy ..	n.r.
Fish River ..	n.r.
Spitzkop ..	n.r.
Phizantefontein ..	n.r.
Biesjesdam ..	0-11
Groot Vley, Theebus ..	n.r.
Kleinhaasfontein ..	2-11
Scorpion's Drift ..	0-00
Zeekoegat ..	0-75
Haasfontein ..	1-32

IX. NORTHERN BORDER:

Pella ..	n.r.
Kenhardt ..	n.r.
Van Wyk's Vlei ..	n.r.
Prieska ..	n.r.
Dunmurry ..	0-41
Griqua Town ..	0-81
Campbell ..	0-98
Douglas ..	0-79
Avoca (Herbert) ..	0-46
Eskdale ..	0-95
Hopetown ..	n.r.
Orange River ..	n.r.
Newlands (Div. Barkly West) ..	n.r.
Kimberley (Gaol) ..	0-67
Do. (Stephens) ..	0-74
Bellsbank (Div. Barkly West) ..	n.r.
Grootdrink ..	n.r.
Barkly West ..	0-31
Upington ..	0-18
Trooillapspan ..	n.r.
New Year's Kraal ..	0-70

X. SOUTH-EAST:

Melrose ..	1-56
Varken's Kuil (Div. Bedford) ..	n.r.
Fairholt ..	2-34
Cheviot Fells (Bedford) ..	n.r.
Alicedale ..	1-52
Bedford (Gaol) ..	3-25
Do. (Hall) ..	n.r.
Sydney's Hope ..	2-00
Cullendale ..	n.r.
Adelaide ..	3-00
Atherstone ..	2-72
Alexandria ..	3-95
Salem ..	n.r.
Graham's Town (Gaol) ..	4-36
Do. (Bact.Inst.) ..	4-24
H. atherton Towers (near Graham's Town) ..	1-38

X. SOUTH-EAST—continued.

	INCHES
Thorn Kloof, Upper Albany ..	2-22
Fort Beaufort ..	2-75
Katberg ..	4-60
Do. Sanatorium ..	4-28
Balfour ..	4-87
Seymour ..	4-98
Glencairn ..	n.r.
Alice ..	4-48
Lovedale ..	n.r.
Port Alfred ..	3-67
Hogsback ..	4-64
Thaba N'doda ..	8-58
Peddie ..	3-83
Oathcart ..	2-15
Keiskama Hoek ..	5-73
Crawley ..	2-69
Thomas River ..	4-12
King William's Town ..	5-15
Do. Hospital ..	6-26
Stutterheim (Wyldes) ..	n.r.
Do. (Besté) ..	3-44
Dohne ..	4-01
Kubusia ..	6-00
Blaney ..	n.r.
Kai Road ..	4-92
Evelyn Valley ..	7-49
Berlin ..	4-40
Isidenge ..	7-08
Pirle Forest ..	4-65
Quacu Forest ..	3-77
Kologha ..	3-90
Fort Jackson ..	2-50
Komgha ..	6-58
Prospect Farm (Div. Komgha) ..	5-69
Hopewell ..	n.r.
East London, West ..	2-35
Do. East ..	4-45
Fountain Head ..	n.r.
Fort Cunyngname ..	4-28
Cuylerville ..	n.r.
Bolo ..	3-65
Fort Fordyce ..	3-37
Daggaboer's Nek ..	3-43
Scott's Bottom ..	3-31
Forestbourne ..	7-91
Chiselhurst ..	5-08
Mount Coke ..	6-77
Dontsah ..	6-80
Cata ..	6-83
Wolfridge ..	5-31
Sunnyside ..	3-30

XI. NORTH-EAST:

Venterstad ..	1-72
Ellesmere ..	n.r.
Burnley, Cyphergat ..	n.r.
Burghersdorp ..	1-47
Do. (Le Roex) ..	n.r.
Molteno Station ..	n.r.
Cyphergat ..	2-05
Thibet Park ..	1-52
Sterkstroom ..	6-26
Do. (Giddy) ..	n.r.
Rocklands ..	2-05

XI. NORTH-EAST—continued.		INCHES.	XII. KAFFRARIA—continued.		INCHES
Aliwal North (Gaal)	..	2'60	Umtata	..	7'09
Do. (Brown)	..	2'65	Qumbu	..	n.r.
Rietfontein	..	2'40	Kokstad	..	3'28
Buffelsfontein	..	n.r.	Port St. John's	..	n.r.
Hex's Plantation	..	2'25	Umzimkulu	..	2'55
Carnarvon Farm	..	2'14	Woodcliff	..	n.r.
Jamestown	..	1'50	Tabankulu	..	7'62
Queenstown (Gaal)	..	2'80	Kilrush	..	0'65
Do. (Beswick)	..	n.r.	Somerville (Div. Tsolo)	..	5'86
Dordrecht	..	2'05	Tsomo	..	3'86
Tyden	..	2'32	Seteba	..	2'96
Snow Hill	..	n.r.	Flagstaff	..	11'49
Herschel	..	1'44	Quebe	..	6'52
Lady Grey	..	n.r.	Insikeni	..	5'29
Bolotwa (Contest)	..	2'43	Bazeya	..	5'20
Lady Frere	..	4'22			
Avoca (Div. Barkly East)	..	n.r.	XIII. BASUTOLAND :		
Keilands	..	4'14	Mafeteng	..	1'02
Barkly East	..	4'17	Mohalie's Hoek	..	n.r.
Glenlyon	..	n.r.	Qacha's Nek	..	1'08
Gateshead	..	n.r.	Moyeni Quthing	..	3'80
Lyndene	..	1'51	Teyateyaneng	..	1'13
Mooifontein	..	n.r.	Butha Buthe	..	n.r.
Poplar Grove	..	1'63	Maseru	..	n.r.
Biesjesfontein	..	n.r.			
Whittlesea	..	1'40	XIV. ORANGE RIVER COLONY :		
Halseston	..	1'53	Bethulie	..	1'22
Middlecourt	..	2'55	Smithfield	..	..
Sterk-pruit	..	2'05	Wepener	..	..
Doornkop	..	4'27	Kroonstad	..	n.r.
Blikana	..	2'75			
XII. KAFFRARIA :			XV. NATAL :		
Slaate, Xalanga	..	n.r.	Durban, Observatory	..	0'73
Ida, Xalanga	..	n.r.			
Cala, Xalanga	..	n.r.	XVI. TRANSVAAL :		
Cofimvaba	..	n.r.	Johannesburg	..	n.r.
Nqamakwa	..	4'48	Do. Cemetery	..	n.r.
Main	..	n.r.			
Engcobo	..	5'30	XVII. BECHUANALAND :		
Butterworth	..	n.r.	Vryburg	..	0'36
Kentani	..	n.r.	Taungs	..	0'55
Maolear	..	n.r.			
Idutywa	..	4'00	XVIII. RHODESIA :		
Willowvale	..	7'54	Salisbury	..	n.r.
Mount Fletcher	..	6'48	Hope Fountain	..	0'00
Elliotdale	..	n.r.	Geelong	..	n.r.
Mqanduli	..	n.r.			
Matatiele	..	n.r.			

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EDITORIAL NOTES.

Prospective orange growers, apprehensive of the *mal-di-gomme* or root-rot disease, will be gladdened by reading the communication from Mr. J. W. Mills, the Superintendent of an experimental station in Southern California, which is published in this issue under the heading "Bitter Seville Orange Stocks." The Bitter Seville is well known to be strongly resistant to the disease, and hence it has long been advocated as a stock for the susceptible sweet orange and the

lemon. Unfortunately, however, Cape experience has determined that what is known in this country as the Bitter Seville, though resistant to the disease, is not a suitable stock for the Washington Navel and a number of other varieties which Cape orchardists are ambitious to grow. The Department of Agriculture has sought to ascertain the experience of other orange-growing countries; and from what has been learned, it appears fairly certain that in the Florida Sour type of the Bitter Seville is a resistant stock that will carry the Washington Navel in a perfectly satisfactory manner. Mr. Mills' letter leaves no room for doubting that such is the case in California, and in California the Florida Sour is in a climate more unlike that of Florida than it will be in here at the Cape.

What is more to the point with the Cape orchardist than the citation of over-sea experience, however, is the announcement incidentally made in introducing Mr. Mills' letter that the Department is making arrangements for an elaborate test of orange stocks. It is hoped to definitely determine the relative affinity of the principal commercial varieties of oranges and lemons for various strains of the Bitter Seville orange, including the Florida Sour, and to show by parallel tests the comparative worth of the rough lemon and pamplemousse as stocks.

Mr. Hudson's report on the Oversea Fruit Trade of the Cape for the 1902 season (published on page 239 of this issue) is of considerable interest. It brings the whole question right up to date and contains some valuable advice. Taken on the whole it is encouraging, for it shows a distinct all round improvement on previous years. This means progress, and progressive improvement spells ultimate success. The hints under the heading of "Selection of Fruit" should be carefully studied by all interested. A loss of 10 to 25 per cent. through careless selection is scarcely a wise method of going to market.

Cuzco maize came to the Cape with a tremendous reputation, but it is our unpleasant duty in this issue to report its comparative failure. On page 233 full reports of a complete system of trials appear, and they will, doubtless, be read with interest. Cuzco maize, —or as we would say in this country, mealies—comes from Peru. In its native soil it gives a magnificent yield and is, in all probability, the finest mealie produced in any part of the world. That the first experimental sowings should have failed in South Africa is, therefore, all the more to be deplored, for if it could be acclimatised it would undoubtedly have added considerably to the productive power of many districts. The causes of the failure seem to be many. In some places the season was bad and even the hardy grains of the country succumbed. In others it was attacked by various pests before it could

make any growth and scarcely had a chance. But even in those districts where it came to fruition the experiment can scarcely be classed as a success. The prevailing conditions of South Africa would appear to be unsuited to this particular grain, though further experiments later on might meet with more success. In Peru this grain grows best at an elevation of about 9,000 feet above sea level.

Some lengthy extracts appear on another page from the pamphlet just published by the Colonial Veterinary Surgeon on the subject of Rinderpest. Apart from the scientific interest of the subject it has, unfortunately, a practical side just now, for the country is far from completely rid of that scourge. But the terrors of Rinderpest have been modified by a closer acquaintance, and our cattle farmers no longer look with despair towards the direction in which the disease last made its appearance. They feel a certain amount of confidence in being able to cope with any ordinary outbreak, thanks to the careful study of the disease which the great calamity of a few short years ago compelled. There should be hope of ultimately driving the scourge from the country altogether in time, for our climate may be of great assistance. There is no germicide like bright sunshine, and with care and close attention to the instructive work of Mr. Hutcheon and his able staff there is no reason at all why nature should not assert her privilege and reject rinderpest from South Africa. The great danger is re-infection from the north and the possibility of a feeling of over-confidence growing on our people. But setting these dangers aside and presuming a continuation of watchful care in the future, with the application of prompt measures of prevention wherever the disease may appear, the chances are more against a recurrence of the pest in epidemic form than in its favour.

Probably the most valuable part of Mr. Hutcheon's contribution on this important subject is that in which he offers his recommendations as to the future treatment of the disease. These he summarises under the heading of "Considerations for Future Action." His optimism is quite cheering, and as it is based upon the most careful deductions after a long experience of his subject we may accept it as containing the germs at least of finality. While admitting the claims of the various systems of preventive inoculation which have proved more or less successful in the past, he pins his faith in the end to serum as that upon which our principal reliance must be placed. And the reasons he gives are most convincing. They are:

- (a) Because it can be produced in large quantities, and kept for long periods ready for use as required. The serum prepared by Drs. Turner and Kolle at Kimberley in 1898 retained its

- efficacy unimpaired for two and a half years, and some of it was used effectively after three years, but its strength was evidently becoming reduced at the latter date.
- (b) Its strength can be ascertained before it is issued for use, hence the dose can be regulated.
 - (c) Its action is immediate, a clean animal is safe as soon as it is inoculated.
 - (d) It is also curative in its action in the early stages of the disease when used in large doses.
 - (e) It does not—as far as is known at present—communicate any other disease.

The complaint of our Herschel correspondent with regard to the want of proper pens at many of the country stock sales is, unhappily, but too well founded. But the system quoted as Australian is gradually coming into vogue, and the larger auctioneers in the stock districts provide proper pens for all stock coming to them for sale. This is a question in which some of the municipalities might interest themselves. Markets properly equipped for the sale of slaughter stock should prove attractive to farmers and dealers alike.

On another page of this issue will be found a comparative record of the results obtained from trellised vines as against vines trained in the ordinary manner. Although it would not be over-wise to accept the results as final, there can be no doubt that the advantages seem all on the side of the trellised plants. Experiments are proceeding, however, and we hope to be in a position before long to lay before our readers some more facts which may be of considerable help to viticulturists. That there is something in the system of trellising if properly carried out seems certain, and if there is an advantage the vine-growers of the Cape may as well share it as the others.

Mr. C. Mayer, the Agricultural Assistant at Stellenbosch, furnishes a return showing in tabulated detail the complete distribution of American vine cuttings for 1902, and with the return adds some comments. Judged by the mere statement of figures it would appear that an enormous demand for the cuttings remained unsatisfied, the greatest shortfall being in *Rupestris-Metallica*. This we are advised is accounted for to a large extent by the habit of over-application which has grown among the farmers. As their previous applications were not met in full many of them have got into the habit of applying for considerably more than they really require. In the face of the facts which have come to the knowledge of the Department—facts which show the figures to be somewhat misleading, though accurate in themselves—it is felt to be unnecessary to attempt to meet the demands on the higher scale.

Another point to be considered in connection with the distribution of American vine cuttings is that of private enterprise. The Agricultural Department has done its part and will continue on the same lines, but has no desire to compete with legitimate industrial enterprise. Nurseries for mother plants have arisen in several districts, some the result of individual effort, others again brought about by co-operation. Many viticulturists have wisely adopted the plan of installing their own nurseries for mother plants, a plan which is full of promise for the whole industry. These private enterprises, which are becoming increasingly fashionable, have proved a great aid to the efforts put forth by the Government, and it is felt that their natural expansion will soon fully meet the whole of the legitimate requirements of the country, seeing that the output from these plantations is increasing year by year.

Our Herschel correspondent is evidently struck with the reported virtues of the Rotary Dutchman Disc Plough, and asks some questions in another column which should call for an answer from those who favour this implement. Will some practical farmer who has worked with this plough kindly forward a few remarks on the subject. Trial results are not always all a man wants when he is making enquiries of this nature. An ounce of solid experience with an implement is worth several pounds weight of trials. The Dutchman has been so highly commended on every side that we should be pleased to hear that it comes out on top—even though boulders may be in the way.

Mr. Lounsbury, the Govt. Entomologist, carries the study of heartwater one stage further in this issue. His experiments seem to place his contention beyond doubt that the disease attacks calves as well as sheep and goats, though there would seem to be many dissimilarities in the symptoms. The interesting fact remains, and is now on record, that an attack of the calf-disease confers resistance to heartwater, and, conversely, that an attack of heartwater confers resistance to calf disease. These two points should be of value in further experiments in the direction of establishing a preventive.

The mention of wild dogs in the last issue of the *Journal* has brought forward a suggestion as to coping with these pests. They are always to be attracted by meat—pork or goatflesh for preference. By dissolving strychnine in alcohol, by heating, a kind of emulsion or paste is obtained. This can be smeared on the meat, and the dogs soon smell it out with disastrous results to themselves. Care should be taken to keep the meat away from domestic animals. Baboons may be poisoned off by the same preparation. Mealies steeped in it

and hung by wires on the trees where the baboons can see them have proved irresistible to these marauders.

Messrs. McDougall, the sheep-dip manufacturers, are introducing Insecticide and Fungicide washes for fruit trees. Samples are being distributed to the following fruit districts: Paarl, Constantia, St.ellenbosch, Oudtshoorn, and Lower Albany. Messrs. Pickstone are trying them. We hope to have something to say later on as to their efficacy. They have proved successful in England and Australia

Stock losses loomed large at a recent meeting of the Stutterheim Farmers' Association. A list was produced showing a total of 1,404 sheep lost by nine farmers in twelve months, the bulk being set down to the debit of native thieves. Beer-drinking among the natives is said to be at the bottom of the mischief.

The Chalumna Farmers' and Fruit Growers' Association is evidently an essentially practical body. The necessity for fertilisers having arisen, they have decided to have samples of the soils of the district carefully analysed in order to determine the precise kind of fertiliser needed for the various requirements. Farmyard manure is scarce in those parts.

The Elsenburg Students' Magazine has come to hand once more and a lively and interesting number it is. It includes among other good things an appreciation of Dr. Marloth, imported stock at Elsenburg, and a special article by the Colonial Veterinary Surgeon entitled "Some Hints on the Re-stocking of the South African Colonies with Cattle." The recipient of the award of merit is Mr. R. Thornton, of Blauwwater.

The purview of *The Field* on the world's tobacco trade does not seem to be quite complete. It mentions pretty well every tobacco-producing country except South Africa. The reason of this is probably because our export trade in tobacco is comparatively insignificant. Considering that apart from the enormous trade in South African tobacco, the cigar factories of the Cape turn out something like 4,000,000 cigars per annum, we have some claim not to be overlooked.

Labour, among other matters, is agitating some of the Frontier Farmers' Associations. Coolie labour is looked at askance, and suggestions are thrown out that the provisions of the Glen Grey Act should be strengthened and the area of its operation extended. Native labour is certainly better than the imported article, and it is hoped the complaint of shortage will soon cease.

There is quite a boom on Angoras in America, and all the agricultural papers are full to overflowing of the virtues and profit of mohair raising. It is not surprising that there is some excitement when it is seen how glowingly the case of the Angora is stated. Among his other qualifications for economic farming it is claimed that he is a kind of patent scrub-exterminator, and that all one has to do is to let a flock of them loose in scrubby lands and they will clean them up and prepare them for cultivation in a very short space of time. To men taking up such lands the prospect of getting them cleared and making a profit out of the operation must be very tempting indeed.

But it is not only as a scrub-raser that our old friend the Angora is being sought after in the United States. There is evidently a big boom on in mohair as well. In the *Oregon Agriculturist* we read of enormous prices being paid for long hair. One dealer, a Mr. Levussove, boasts in cold print of having paid two dollars a pound (a trifle of 8s. 4d.) for one fleece. It is admittedly a special fleece of special length, being 18 inches long—and 18 months growth—being described as of good colour, strong, elastic and coarse. It may be the protective tariff that accounts for the price, or it may only be a move in a game whose ultimate object is the disposal of similar stock. But in any case the Angora breeders of South Africa would jump at anything like the price offered, or even a half of it. Mr. Levussove says he is open to buy a thousand pounds of the same hair at the same price. It seems a pity that Bradford cannot be induced to take the same view,—for if it is long coarse hair that is needed there is very little difficulty in providing it. The difficult stuff to raise is the fine hair that will compete with the Turkish product.

It is amusing, however, to note in the midst of all this Angora excitement the communication of Mr. G. A. Hoerle, published in the same journal, the *Oregon Agriculturist*. This brings us to that stage where we are compelled to discredit somebody. On the one hand lavish prices are offered for an article which, commercially speaking, might make an excellent substitute for horsehair. On the other hand we find a man whom we know by actual contact, telling us that the great trouble of this Colony is that it is debarred climatically from ever producing a really good quality of mohair. And then when we seek further enlightenment we find Mr. Hoerle preaching a counsel of perfection to Cape breeders, and exhorting them to try and rival the Turkish product—even though the climate is against it. And the ultimate conclusion he arrives at is a deep regret that America cannot recruit its flocks from this country. What it all amounts to is not quite clear.

Yet later on we find the *Oregon Agriculturist* coming to the rescue and giving a little intelligent guidance to the goatmen. In this we

find no reference to the fanciful prices paid for a single fleece but some hard commonsense remarks upon the industry which call for consideration. Says our contemporary: "Some of the leading Angora breeders of the middle West believe that the most important points to be worked for in breeding the Angora are increased size of the animal and increased weight of fleece. Our view of the case is different. It is comparatively easy to develop increased size and increased weight of fleece, but the easy methods of bringing this about naturally tend also to coarseness of hair. If there is any one thing which a long-range study of the mohair industry of South Africa seems to plainly point out it is that the greatest mistake which has been made in that country is right along this line. The weight of the fleeces of their goats has been increased at the expense of fineness."

"There is," continues that journal, "a broad field of usefulness for fine mohair, and the finer it can be made without a sacrifice of other valuable features the wider the field will be which opens before it. At the present rate of increase in Angora goats it will be but a few years until the price of what would now pass for average American mohair will be very low. There is no occasion to fear that fine mohair will not always be in demand at fair to high prices, and that the demand will grow more stable as the quantity produced increases. We believe that the most important points to be worked for are fineness of fibre and freedom from kemp, then density of fleece with sufficient length of hair. This will result in increased weight of fleece. With these characteristics firmly established, increased size and early maturity may be sought, but the work will have to be done skilfully because of the natural tendency of an animal which grows larger than the average to also have coarser hair than the average. Skilful breeding can, however, develop size without a sacrifice of fineness of hair as is illustrated by the Rambouillet sheep." This is all like an echo from the Cape, and our breeders have heard—though they have not always heeded—it before. Is it not rather a mistake to quote the Rambouillet as a parallel? If the new American Angora is to follow on the same lines he will soon produce more grease than hair, and experience in this country shows that the oily goat, as we call him, always runs coarse. If fine hair is to be produced fine goats will have to be bred from.

To show the condition of the mohair industry in the United States we publish the following giving the product of each State according to the last census:—

STATE.					POUNDS.
Oregon	...	...	...	...	267,780
California	...	...	...	...	169,770
New Mexico	...	...	...	...	113,515

STATE.	Pounds.
Iowa	28,080
Arizona	27,030
Idaho	11,638
Nevada	10,500
Colorado	1,843
Michigan	1,832
Arkansas	1,763
North Dakota	1,220
Massachusetts	1,120
Indiana	867
Indian Territory	760
Georgia	726
Minnesota	506
Alabama	469
Connecticut	465
North Carolina	416
New York	383
Maine	105
New Hampshire	30
Florida	20
Rhode Island	10
Vermont	5

At first blush it may be asked, and with some show of reason, why it was considered advisable at the present juncture to publish Mr. E. Hutchins's paper on the Metric System in the *Agricultural Journal*. But a little thought will, we believe, effectually supply the answer. If there is one class of people more than another who should be deeply interested in the question of education it is the agriculturists. We do not say they are; but we repeat they ought to be. It was only in the last issue that an appeal was published calling for more facilities for teaching elementary agricultural chemistry. In the depths of the metric system of weights and measures lies relief. Let us once make up our minds to take the plunge and, at one stroke, as Mr. Hutchins points out, we should be freed from wasting our manhood in childish arithmetical sums. The time now wasted at school in mastering a complicated system of coinage, weights and measures might then be devoted to acquiring the rudiments of more important knowledge. The adoption of the metric system means more to the farmer than to anyone else because it gives him a system by which he can check everything that goes on around him with confident accuracy and give him a knowledge of business methods he could never otherwise gain. It may not help him to count a flock of sheep but it will help him to check his wool accounts with ease. It is not to be supposed that a reform of this nature is to be secured for the asking, but it is as well to ventilate the subject.

When Professor John Perry (whose communication to *Nature* appears on another page) raises his voice and cries for a new invention to save the coal supplies of the world, he, like all men with fixed ideas, can only see the question from his own standpoint. Professor Perry sees the enormous consumption of coal that goes on yearly. He sees no signs of any decrease, rather the reverse, for the enormous engines of modern days add to the yearly rate of consumption. From this he argues the exhaustion of the world's coal supply, and then—an era of darkness and stagnation. This view is shared by many other scientists, and that is why the unattainable in the shape of an energy engine has such an attraction for so large a number of the more thoughtful. What the future may produce it is impossible to say. The scientific mechanic of the next century may provide mechanical perfection in the shape of an engine that may need little or no fuel. Even perpetual motion is not entirely beyond the scope of the human intellect. But all these things are very problematical and it is much safer to take things as they are.

This is exactly what Mr. E. Hutchins has done with Professor Perry. He takes things as they are, and going a little further back raises an interesting question. The forest is the mother of the coal measure. That is incontrovertible. Then why worry about the problematic exhaustion of the latter when, asks Mr. Hutchins, man can produce the former practically at will? As forests were man's natural fuel providers ages before coal was known, it is safe to assume that they may be his main source of heat and energy when the coal measures are exhausted. The question of fuel is more likely to develop along the line suggested by Mr. Hutchins than along that deplored by Professor Perry, and this brings us to a consideration of the question from the local standpoint.

Tree-planting and forestry in all its branches is of such vital importance to South Africa that, if placed in its proper relative position, it should rank high among our staple industries. We yet hope to see it in its proper place in the country, but fear that it will take some time to educate the people to the full value of its benefits. Let any thinking man read the two letters on another page—the one by Prof. Perry and the answer by Mr. E. Hutchins, the Conservator of Forests, Western Districts, C.C.—and he will realise the enormous possibilities which lie in the future of arboriculture. Forestry, however, is not attractive because the return is slow. It means waiting a few years for a first return. But what is usually overlooked is the fact that once the return commences it continues steadily and does not exhaust itself if the forests are attended to with care.

The question of fuel supply opens yet another phase which neither of the controversialists touch upon. With the advent of the motor car alcohol is beginning to figure as a serious fuel for light engines. As alcohol can be distilled from any kind of grain and many other forms of vegetation this is a point in favour of Mr. Hutchins. In fact, when the whole case is considered it seems quite reasonable to suppose that the ingenuity of man, if he is baulked in his endeavours to meet the fuel question mechanically, will fall back upon the production of natural fuel by the process of vegetation. In that case the probabilities are all in favour of the production of an article which may be relied upon to meet the needs of the case. Cultivation, intelligently directed, is as great a beneficial force as science or engineering.

Among the innovations promised in the near future in the shape of rural industries in South Africa, is that of horse breeding on a large scale. The Imperial authorities are stated to have arranged to draft off two thousand mares from the Remounts to be located in the Rustenburg district. This district is selected because of its fertility and the richness of the pasturage, but has never been known as a horse district in the past. In fact it suffers a good deal from horse-sickness. However, we trust the experiment may succeed. The plan is to divide the two thousand into herds of two hundred each, starting thus with ten contiguous stud farms. Afterwards stud farms will be established at other centres. The best brood mares have been collected that are available—and these include English, Irish, Australian, and the best that are of the Boer strain. The question of the sires is one which must remain dormant for some time, because the regular season cannot be said to commence until September or October. Arrangements are made for the regular feeding of the mares, eight pounds of grain per day to each being mentioned as the allowance, in addition to grazing by day. Taken altogether, the plan is to carry out these breeding establishments on a large scale in the same manner as that which has proved satisfactory in Australia. In the horse-breeding establishments in Australia the strain has been mainly a well-bred British horse with an Australian mare, and the result shows that the progeny can thrive on the salt bush and various herbage to be found in that country. Australians consider that South Africa is very suitable for breeding purposes. There is not much fear that the death-rate of foals and mothers will be excessive, the main cause of mortality among foals being chill and inanition.

FARM AND VELD.

SEASONABLE NOTES.

The heavy rains during August in the Western Province have done a fair amount of damage by washing out and inundating crops. Farming operations were considerably delayed, and though glorious weather followed the week of deluge, farmers are still behind. We regret to state that Rust has already been reported to have been observed in wheat in the Stellenbosch division.

September is the month for the completion of most tillage work. Vineyards and fruit trees should be planted as soon as possible so that the plants may still catch the late rains. Where orchards and vineyards have not yet been properly cultivated, no time should be lost in attending to this most important work as it tends to preserve moisture, of which the greatest amount is required during spring and early summer, when plants make their biggest growth and have to set their fruit.

Disbudding, that is the removal of all unnecessary buds before they burst in leaf, is recommended in the treatment of young vines not yet completely shaped. Though it has hardly ever been practised in the Colony, it is an excellent method to avoid the formation of unnecessary wood, it saves a lot of pruning the following winter, and strengthens the shoots required to form the vine.

During this month the Oidium, or "Druive Ziekte," should not be forgotten. Though little can be seen of it, it is there, as it appears, so to speak, with the young shoots, and sulphuring is recommended wherever shoots attain a length of several inches in the course of the present month.

On account of bad pasturage and scarcity of water farmers in this Colony are frequently compelled to move their flocks to more favoured parts of the country. During the past month many thousands of sheep and goats have been sent from one district to another for change of pasture; and unless rain falls at an early date, some divisions will be completely denuded of small stock. If these flocks were free from scab, the majority would soon recover when placed in the midst of plenty; but unfortunately such is not

the case, for by far the larger number of the stock are infected with scab, and in many instances the flocks are in a deplorable state, causing untold loss and annoyance to those owners over whose ground the sheep are moved.

By the exercise of a little common sense and foresight a great deal of the mortality amongst stock which is usually attributed to drought and bad seasons might be obviated. In some parts there is a very prevalent idea that scab is caused by dust, dry weather, bad water, etc., and consequently when the disease first makes its appearance no efforts are made to stay its progress. The usual argument is, that as the flocks are kraaled during the night, every moment of daylight is required for picking up the scanty herbage. This theory may be quite correct as long as the sheep are free from disease; but when scab exists, the first and main object should be to prepare the stock for the severity of the drought by keeping them in a healthy state even at the expense of a few hours hunger, occasioned by the operation of dipping.

When sheep are emaciated in condition and the wool deprived of its natural yolk, scab increases in a most alarming manner. One week a few sheep may appear to be infected, and the next a clean and healthy animal may be searched for in vain. In this state the stock are often driven from one district to another. Travelling is slow, and some days little or no progress is made. Where the veld is good delays are more frequent and prolonged, and so the trek proceeds, until some farmer more sympathetic than his neighbours lets a portion of his ground until such time as the stock-owner can return to his own district. During the course of the removal a few cripples or enfeebled sheep are left at one farm, a few more at another, and these (or as many of them as survive) the owner promises to pick up on his home journey. Can it be wondered at then that scab cannot be eradicated from this country? Farms are infected along the route taken by the diseased flocks, stray animals are left in every direction to wander about and spread the infection to surrounding flocks, and the work and expenditure of years is rendered unavailing owing to gross carelessness and ignorance.

Until farmers make a determined effort to cleanse their flocks and keep them free from disease, the best efforts of sheep inspectors and progressive men will have but little effect. What is required is—"a strong pull and a pull altogether."

The Codling Moth has spread a great deal through the Western Province during the last two or three years. This fact is very

noticeable in the Cape Peninsula, so much so that the old-time pleasure of suburban fruit growing will be soon wholly past history. With the birds to take the figs and loquats, scale insects the citrous fruits, the fruit fly the peaches, and the Codling Moth the apples and pears, there is no enjoyment in gardening as a means of recreation. All the pests may be combated and sound fruit in plenty secured despite of them, but the gentleman gardener does not want to disfigure his trees by enclosing them in bed canopies, nor does he relish plastering them with vile-smelling washes, or drugging them with hellebore, Paris green and cyanide gas, nor having them wear short skirts for the trapping of unwary Codling Moth caterpillars. To the fruit grower proper, however, the pests are practically a blessing, for unless he is much worse off as regards them than his competitors it pays him very well indeed to resist their encroachments, and he gets a far better return for his products than if everyone could raise perfect fruit as easily as morning glories and nasturtiums.

Hence fruit growers should not feel discouraged because the Codling Moth has reached them, but should prepare at once, now at the beginning of the season, to make matters utterly disagreeable for the insect. At this time the caterpillars are snugly ensconced in silken cocoons within nooks and crannies of the bark, both of trees that are esteemed for their products and those whose value may be reckoned in their worth as firewood. In another month the caterpillars will be changing to pupæ, and a little later the pupæ will turn to moths which will seek the newly formed fruit. The worthless trees in the orchard, hedgerow and elsewhere should be cut away now and the wood disposed of before the time for the emergence of the moths. The loose bark of all the other apple and pear trees should be scraped away. Many of the caterpillars will thus be exposed to their enemies and many more may be burned with the scrapings. Holes in the trunks and branches should be cleaned out as much as possible, and it would be well to make good resolutions to so trim and treat the trees in the future that such vermin-sheltering places are not encouraged to form.

It is of no use to spray now for the Codling Moth, but if time permits bandages to trap the caterpillars may be applied to advantage. These need be nothing more elaborate than eight inch wide strips of bagging material doubled and stretched around the trunk and there held by a string about the middle or a tack through the lapped ends. Some of the caterpillars, disturbed by the cleaning of the bark or perhaps by the tillage of the land (especially in the case of young, smooth-barked trees), will seek shelter in the bands and may be easily disposed of in one or two examinations before the fruit sets. The real work for the bands will, however, come after the middle of November.

A very decided increase in the numbers of fruit trees imported from abroad is one of the many manifestations of the return of Peace. At present most of the consignments are from Australia, but as the shipping season for the northern hemisphere comes on there will no doubt be some large importations from America. For many reasons the selling price of nursery stock at the Cape is higher than in Australia and America, and this fact is the chief explanation for the continued introduction of varieties which Cape nurseries are fully prepared to supply. Orange trees may be purchased in Melbourne at one-half the price quoted by Cape nurseries for the very same grade of stock, and on the face of matters it looks as if it would be profitable to import from there, a view that the many Australians now at the Cape are not slow to impress upon their acquaintances. But it is very likely that the importations will not go beyond the stage of trial orders, for the expenses are heavy and the risks very large. Some consignments arrive, it is true, in very good condition, but others that were packed with equal care are often found practically worthless when opened at the entrance port for the customary examination for noxious insects.

Nearly all of 2,000 citrous trees and 10,000 apple trees that arrived by the last steamer from Australia were dead to the roots. The experiences of other years have made it certain that the risks in getting stock from America are equally great. A couple of years ago one American company took a large number of orders through an agent. The stock to fill them duly arrived, but very little of it was in a fit condition for distribution. Altogether the introduction of living plants in quantity from over-sea is a speculation, and not many orchardists can afford to speculate when failure may mean the loss of a planting season, perhaps after the expense of preparing the land.

There are a few Government restrictions on the introduction of trees and plants of all kinds which should be borne in mind by all intending importers. The introduction of coffee trees—and by this is meant any and all parts of the plant with the exception of the bean for consumption—is entirely prohibited. Grape vines may be only introduced by the Government. Stone fruit trees, that is the peach, plum, prune, cherry, apricot, almond and the like, are prohibited if from the United States or Canada; and such trees from elsewhere must be accompanied by a sworn declaration to the effect that they were not grown in the countries mentioned. The failure to observe this regulation has made trouble for several recent importers.

Aside from the restrictions noted, all trees arriving at the Cape are carefully inspected to determine their condition as regards pestiferous insects and, as far as possible, of plant diseases. Pest free plants are passed without any trouble or expense to the consignee,

but all of any consignment in which noxious insects are discovered are exposed to hydrocyanic acid gas fumigation or more severely treated. Sometimes whole consignments are ruthlessly burned. The consignee has to pay for fumigation, and the Government pays no compensation when articles are destroyed or in any wise damaged. Most Australian stock has to be put through the gas chamber, and however quickly and carefully the work may be done some injury to the trees is almost sure to result. Parties who order from abroad should urge their consignees to send only perfectly clean stock and to so pack this that it may be thoroughly examined, say by removing the top and bottom of the containing case, without complete unpacking and the attendant exposure of all the roots. Citrous trees should be stripped of their foliage if many are packed together.

HOW GERMS GET INTO MILK.

From Bulletin No. 152 of the New Jersey Experiment Station, U.S.A., we take the following extract:—

"In the first place, a good many germs are living in the milk while it is yet in the udder of the cow, and in the next place, a good many more fall into the milk pail from those floating in the air, being caught in the streams of descending milk. Still others are introduced clinging to the particles of dust, dirt, hair, chaff, etc., that become loosened from the udder and adjacent surface of the cow, and from the hands, arms, etc., of the milker, and from the whisking tail of the animal. It is the presence of numerous particles of this sort which is responsible for the general practice of straining milk. But no strainer is fine enough to retain the smallest particles, and least of all the germs that have been washed out of the particles. In those dairies where the practice of keeping cows and stalls thoroughly clean has not been adopted, the dirt that most frequently gets into milk consists of particles of manure. The presence of even a little manure imparts to the milk the peculiar flavour called 'cowey,' as though it were the distinctive odour of this domestic species. But this flavour is quite distinct from the odour of new, pure milk (also found in the cow's breath, over which poets have raved in ecstasy). In these days of 'modern dairy progress,' the production of 'cowey' milk is both inexcusable and reprehensible. Milk has a strong attraction for odours and readily absorbs any predominant odour of the air, etc., it is in contact with, hence it is not strange that it extracts the odour of the dirt that falls into it. In fact, if the milch cow's food has any peculiar flavour it affects the milk. These various disagreeable flavours in milk are of less consequence than the fact that milk receives the germs that inhabit the dirt which gets into it. Of all dirt, manure is the richest in germ content, and what is even more important, it contains germs that are parasitic in the intestines and hence are liable to produce disease."

RINDERPEST IN SOUTH AFRICA.

Its History, General Character and Treatment.

(By MR. DUNCAN HUTCHEON, Col. Vet. Surgeon.)

Mr. D. Hutcheon, the Colonial Veterinary Surgeon, is publishing at an opportune moment a valuable pamphlet on Rinderpest in South Africa, giving a short description of its history, general character and methods of treatment. The pamphlet is now in the hands of the printers and should soon be ready for distribution, but as the subject is of vital interest to the farming community throughout the whole country we take the liberty of reproducing a few extracts from an advance proof.

The pamphlet opens with a concise but none the less interesting sketch of the history of the disease, and goes on to show how it advanced southward from the Protectorate in 1896 and the devastation it caused. Passing on then to the disease itself a description is given in very full and explicit terms of all the symptoms, with a differential diagnosis which shows that there are a great many cases in which the characteristic symptoms are not very clearly defined, especially in the earlier stages. The temperature is usually an excellent guide, but this cannot always be relied upon, as we get a high temperature in other diseases involving the digestive organs. For example, there are many cases of Rinderpest in which the flow of tears is not very marked, and the discharge from the nose barely discernible. There is invariably more or less of a dribbling of saliva from the mouth, but we get that associated with Redwater, also congestion of the liver, and other derangements of the digestive organs; while a violent diarrhoea, the fæces being mixed with blood and mucus, is often the accompaniment of inflammation of the bowels, caused by cattle eating certain irritant bulbous plants, such as tulip. Numerous cases of acute catarrh are met with also, which simulate the symptoms of Rinderpest very closely, but the discharges from the eyes and nostrils are more viscid than in Rinderpest, while there is no flow of saliva from the mouth, and the fæces are usually normal. In all outbreaks, therefore, in which only one or two animals are affected, it is necessary to make

A POST-MORTEM EXAMINATION,

and even then, unless the case is sufficiently advanced, the typical appearances—the yellowish gray exudate of the mucous membranes, and the ulcerous erosions of the fourth stomach and bowels—may not be sufficiently developed to lead to a decided opinion on the

case, and unless there is evidence of contagion, further developments must be awaited.

"On viewing the carcass of an animal that has died of Rinderpest, the body is generally much emaciated, and the natural orifices are soiled with a dirty discharge, and the carcass exhales a peculiar foetid odour. The principal and pathognomonic lesions of Rinderpest have their seat in the mucous membranes of the digestive tract, the respiratory passages, and the urinary apparatus. The mucous lining of the mouth is congested, and covered over with a slimy mucus. It presents a bright salmon colour, but if the beast has been killed and bled before examination, this bright pinkish colour disappears. The epithelium is frequently found detached in places, leaving small ulcerated-looking spots. These are met with most frequently on the under surface of the tongue, inner surface of the lips, and on the dental pad. The mucous membrane of the fauces and pharynx is the seat of catarrhal inflammation, and covered with thickened mucus—sometimes purulent. The nasal mucous membrane is likewise the seat of catarrhal inflammation, its surface being covered with purulent mucus, and towards the openings of the nostrils, small ulcers or abrasions are frequently met with. After passing the pharynx and larynx, there is very little change to be observed in either the trachea or œsophagus. Slight catarrhal inflammation is sometimes met with in the bronchial tubes, with collapse of some of the smaller lobules. Pulmonary emphysema may also be present, but, as Williams remarks, this is due to the formation of gases in the areolæ of the connecting tissue. But the changes in the lungs are neither constant nor pathognomonic, and are secondary as a rule. There is sometimes echymotic patches on the endocardium of the heart, and similar spots are met with, occasionally, on the epicardium, with a little fluid in the pericardial sac. On opening the abdomen, the peritoneum is congested and very frequently spotted, and there is a variable quantity of a yellow serous fluid in the peritoneal cavity. It is comparatively rare to find any pathological changes in the first and second stomachs, although a little serous infiltration is sometimes met with under the epithelial lining.

"The third stomach is generally hard, and the food between the leaves dry and caked. But very frequently, more especially if the sick animal has been allowed to drink large quantities of water, the contents of the third stomach are found quite fluid.

"It is in the abomasum or fourth stomach, and the intestines, where the most marked and characteristic changes are met with. The mucous membrane of this stomach is the seat of acute catarrhal inflammation, the sub-mucous tissue is swollen, and infiltrated with a serous effusion, especially on the rugæ or folds. The mucous membrane is also swollen, and its epithelium detached—desquamated—in patches of various sizes, leaving ulcerated sores, more particularly near the pylorus or bowel, and, where these ulcers present the appearance of dark eroded sores, with the yellow degenerated tissue

resting in their centres, small petechial spots are often found studded all over the congested area.

"In the small intestines we find congestion and inflammation of varying degrees of intensity, with a muco-purulent greyish yellow exudation, in some cases covering innumerable small spots scattered all over the mucous membrane of the bowels; in other cases this exudation is found covering almost the whole surface of the mucous membrane. In more severe cases this presents the appearance of a thick croupous-looking exudate, which—in parts—forms a complete cast of the bowels.

"In such cases the epithelium is thickened, softened, and is found detached over large patches throughout the small intestines, leaving the membrane red and granular looking. Peyer's glands or patches are generally inflamed, swollen, and denuded of epithelium. The changes in the large intestines are not usually so well marked or so uniform. In many cases the inflammation is more in patches, and in the rectum the mucous membrane is often intensely inflamed, and presents a blood-streaked appearance. The epithelium is swollen, and covered over with a muco-purulent exudate, while there is more or less infiltration of the sub-mucous tissue. In many severe cases, however, the large intestines are just as seriously affected as the small, with numerous small patches of desquamated epithelium. It is a very curious fact also that many of the cases which manifest the most severe external symptoms do not show the most characteristic *post-mortem* lesions.

"The liver very often appears congested, and presents a yellowish colour of varying tints. In many of the cases, however, the liver is perfectly normal in character and appearance, and the gall perfectly healthy. The mucous lining of the gall-bladder is sometimes inflamed, especially about the base of the sac, and studded all over with blood spots. The gall presents varying shades of colour, from a deep green to almost blood red, and is often thick and curdy looking. The mucous lining of the urinary bladder is sometimes affected also in patches with a little sub-mucous infiltration, and similar appearances present themselves in the vagina of the female. It is not my intention to go minutely into all the *post-mortem* changes which may be observed in individual cases. The most marked and pathognomonic *post-mortem* appearances are those seen in the mouth and upper air passages, and in the fourth stomach and intestines.

TREATMENT.

"The medicinal treatment of Rinderpest is seldom followed by any satisfactory results. A large number of medicinal remedies were tried, such as germicides, anodynes, astringents and laxatives, alone and in various combinations. Some of these appeared to exercise a beneficial effect, but I am strongly of opinion that the varying success which attended the administration of these several remedies depended more upon the mild or severe nature of the particular

outbreaks, than upon any specific action exercised by the medicine. In its usual virulent form, ten per cent. of recoveries was considered a very fair average, but in some outbreaks fifteen, twenty and up to thirty per cent. of recoveries were recorded, more particularly during the hot dry summer weather.

"In India they have had the same experience. Pease says:— 'The disease in some parts of India, and notably those parts which are naturally hot and arid, where the temperature of the air rises very high, is frequently noticed to be of a far milder type than is the case more particularly in the hills, and it has appeared probable that desiccation of the virus by the great heat and dryness influences its virulence to a considerable extent—60 to 65 per cent. of recoveries may sometimes be observed in the hot districts of the plain.'

"I think there can be little doubt that dry heat does exercise a modifying influence on the virulence of the disease, but it does not altogether account for the exceptionally mild form that the disease assumes on individual farms here and there in a district where the climatic and other conditions are similar to those on other farms adjoining, where the disease presents its usual virulent character."

Be that as it may, I am of opinion that if careful statistics could be collected, it would be shown that, where the affected cattle could be properly attended to, comfortably sheltered from the hot sun in summer, and from the cold in winter, kept away from an unlimited supply of water, and given nourishing gruel to drink, that a higher average of recoveries would follow than where a large number of different medicines are used. I do not mean to infer that medicine is useless in Rinderpest, some may modify the symptoms and alleviate the suffering, but none of the medicinal remedies that I have tried, or heard of being used, appeared to exercise any very marked influence on the course or character of the disease. The Indian Cattle Plague Commission agreed that mild laxatives in the early stages of the disease did good, and Veterinary Surgeon Thacker, who is reported to have treated 2,541 cases of the disease with great success, always gave three ounces of finely divided sulphur in two quarts of gruel morning and evening, until some slight laxative effect was produced.

INOCULATION AGAINST RINDERPEST.

"The principal methods of inoculation against Rinderpest practised in South Africa are bile and serum. The former is used both fresh and glycerinated, and the latter in the form of preserved serum, and as blood freshly drawn from a recovered animal.

Pure Fresh Bile.

"Inoculation with pure bile, either obtained from an animal affected with Rinderpest immediately after death, unless the duration of the disease has been unduly prolonged, or from an affected animal killed while in the last stage of collapse, which is usually about the sixth or seventh day of the fever, or the tenth or twelfth

day after artificial infection. *This is Koch's method.* The dose recommended is 10 c.c., injected into the cellular tissue under the loose skin of the dewlap, and well rubbed in.

"Koch's instructions were to use biles of a dark green colour with a white froth, and it is generally acknowledged that these are the best, but experience has shown that biles of all shades of colour, except those which are red from the presence of blood, and those which are very thin and of a light yellow colour, may be used so long as they are clear and free from any putrid smell. 'Animals which were injected with brownish green gall containing the Simpson bacillus in pure culture, and gall of a brown colour, containing both bacteria and streptococci, became immune without the occurrence of any accidents such as abscesses.' (Kohlstock.)

"As the bile obtained from different animals may vary considerably in strength and immunising properties, all the galls extracted at one time, after being kept separate for twelve hours to see whether they remain all right, should be mixed together, so as to render them as uniform in strength and character as possible. If practicable bile should be used within from eighteen to thirty-six hours after it is drawn, unless it can be kept in ice, when it will keep sweet and effective for a much longer period; but even under such conditions, it should not be kept over four days, as its immunising properties are liable to become modified when kept beyond that period.

"Further experience indicates that the bile obtained from cattle which contracted the disease spontaneously, and is extracted immediately after death, is generally more reliable than bile obtained from cattle which are given the disease artificially, by the subcutaneous injection of virulent blood. Hence smearing the muzzle and nostrils with infective material was considered a more satisfactory method of infecting animals for bile production.

"In connection with this subject Dr. Edington says in his Annual Report for 1897, page 67:—'That according to the recent researches of Fraser, the bile of all animals has peculiar antitoxic virtues, and he suggests that the ingress of poison by the alimentary tract is attempted to be met with, and antagonised by the bile secretion, so that the giving of Rinderpest to animals by the natural channel may—and I think probably does—stimulate bile production. Further, where infection is made through the gastro-intestinal tract, the poison must, in the first instance, act through the portal vein; while in subcutaneous infection the virus must be carried to the liver, for the most part along the branches of the hepatic artery, a most important difference, seeing that in the one case the action proceeds with regard to the hepatic lobules centripetally, while in the other case it proceeds centrifugally.' *

*The fourth stomach in the spontaneous disease presents, as a rule, more advanced lesions than where the disease has been artificially produced. We rarely saw on the bile station such destructive lesions as we found in the spontaneous disease outside. (Shepherd.)

HOW TO EXTRACT THE BILE.

"The animal should be laid on its left side, and the skin and flesh on the right side immediately behind the last rib cut through; the ribs are then raised, and the gall-bladder becomes visible. The gall-bladder is then punctured with a small knife or trocar, and the gall allowed to escape into a wide-mouthed bottle, previously sterilised. If properly stoppered wide-mouthed bottles are not available, then ordinary white quart bottles may be used, with a glass or enamelled funnel, which can be procured from most country stores. Every precaution must be taken that the operation is performed in a thoroughly clean manner, the hands of the operators, and also all instruments and utensils, being thoroughly cleansed and sterilised before use. The surface of the gall-bladder should also be wiped over with an antiseptic solution before being punctured.

DIRECTIONS FOR THE SELECTION OF BILES, &c.

- (a) Biles of all shades of colour, except those that are red from the presence of blood and thin, watery biles of a pale yellow colour, may be accepted so long as they are clear and free from sediment, and where practicable several different galls should be mixed together; this modifies and equalises the strength and safety of the gall. The selected galls should be kept separately for at least 12 hours; if any gall smells or changes colour after keeping, it must be rejected. The good galls are then mixed together before being sent out.
- (b) Gall is considered most effective and gives the best results when obtained from a sick beast on the 10th day after artificial inoculation, or on the 4th or 5th day after the visible symptoms have become apparent in natural infection. Earlier or later galls should be avoided, and gall taken from an animal which has died, unless the duration of the disease is known, is not to be recommended unless carefully examined.
- (c) The gall should be used on the second day after being drawn if practicable, but if kept cool either by placing the bottles in iced chests, or wrapping them in wet cloths, and placing them in a cool draught, may be kept fresh and safe up to the third or even fourth day.
- (d) Both before and after the gall is placed in the bottles, they should be disinfected, and also the cloths that are wrapped round them, before being sent to the inoculator.
- (e) The inoculator should not extract the gall from the affected animal himself, nor come near to the infected cattle; but if it is necessary for him to do so, he should change his clothes and boots, and disinfect his hands well before commencing to inoculate, also see that everyone handling the cattle has been thoroughly disinfected.

- (f) As it is never certain when inoculating within an infected area, that the herd is completely free from infection, the needle of the syringe should be cleaned, and disinfected in a five per cent. solution of carbolic acid or alcohol after each inoculation, and the skin of the animal at the seat of inoculation should be cleaned and disinfected both before and after the operation with Jeyes' Fluid or other similar disinfecting solution.
- (g) The small cup or vessel containing the gall, from which the syringe is repeatedly filled, should be kept covered with a small piece of linen or calico, wrung out in the disinfecting solution, and the operator's hands and syringe should be frequently disinfected.
- (h) As infection may be in any herd unknown to the operator, he should disinfect his hands and clothes well after inoculating each herd, and for the same reason, it is not desirable to have the same boys to assist in catching different herds of cattle.

The objections to Pure Bile Inoculations are :—

- (a) Biles vary so much in their immunising properties, and there is no practical method of examination on the veld which will indicate whether the bile being used is strong or weak in immunising properties; hence the operator is unable to regulate the dose which he should inject, or to calculate the duration of the immunity which the inoculation will confer.
- (b) Inoculation with pure bile does not produce its effects at once, complete immunity is not established until about the tenth day; an inoculated animal may contract a severe form of Rinderpest up to the sixth day after bile inoculation, if exposed to infection.

Further, there can be little doubt that many pure biles intensify the disease, and hasten the fatal termination in already infected animals; it is, therefore, not so suitable for the inoculation of infected herds as glycerinated bile or serum.

- (c) Bile inoculation—either pure or glycerinated—necessitates the destruction of a large proportion of the animals to be inoculated, not less than six per cent. when the necessary care is exercised in the selection of suitable bile. In this respect it compares very unfavourably with serum.
- (d) Lastly, pure bile will not keep. Dr. Turner says :—

“In the laboratory, using minute precautions to prevent the introduction of putrefactive organisms, and by placing the fluid in an ice chest, it is sometimes possible to preserve the bile, in a state in which it can be used without danger, for a period of ten days. But usually the bile is already infected with putrefactive organisms in the gall-bladder itself, so that any amount of care is futile”; and Veterinary

Surgeon Shepherd, when referring to the formation of abscesses after bile inoculation, says "that these are not necessarily due to carelessness—I have frequently found microscopically putrefactive and other bacteria in abundance in the very best looking Koch galls."

Method of Inoculating.

"After having secured the animal to be operated on, the necessary dose of bile is injected under the skin of the dewlap by means of a hypodermic syringe, and well rubbed in. Care should be taken that the point of the needle is not inserted into the flesh, but between the skin and the flesh only. The local result of inoculation with bile is a hard, somewhat painful swelling, about the size of a man's fist, which gradually disappears in the course of a week or two.

Glycerinated Bile.

"Edington's Method is made by adding one part of glycerine to two parts of bile. The mixture should be well stirred together, and allowed to stand for eight days. Experience has taught us, however, that if urgently required, the glycerinated bile may be safely used, even for intravenous injection, forty-eight hours after being mixed. The dose of the glycerinated bile is from 15 to 35 c.c.—according to the size of the animal—into the cellular tissue under the loose skin of the dewlap, and well rubbed in. When used in an infected herd, large doses should be given, as it possesses distinct curative action; and in all animals which have a high temperature, indicating that the fever is already established, large doses should be injected into the jugular vein direct. It was claimed for glycerinated bile that it did not communicate the disease, as fresh pure bile was liable to do, the glycerine having the effect of destroying the active organism of Rinderpest, as well as those of putrefaction, but that it exercised no modifying action on the immunising substances contained in the bile, and although the immunity which it conferred was a passive one, this was considered an advantage rather than otherwise, as it rendered the inoculated animals susceptible to a modified reaction when injected, ten days after, with a dose of 0.1 c.c. of virulent blood. A second dose of virulent blood, of double the strength, was injected from ten to fourteen days after the first. Unfortunately the difference in the strength and immunising properties of the different biles made it practically impossible to fix any exact dates on which to apply the blood inoculations with safety, and yet to give a reaction that would strengthen the immunity. In many herds no visible reaction followed the first blood inoculation, and yet the second blood inoculation caused such a general and severe attack, that a large percentage died of the disease. In some instances even the first blood inoculation caused a heavy mortality, clearly showing that some samples of glycerinated bile gave but a very evanescent

immunity. To overcome these drawbacks, a larger dose of glycerinated bile was used, and it was followed up with blood inoculations at shorter intervals, beginning with 2 minims, and gradually increasing the dose. Several herds were immunised by this method, but it entailed a considerable amount of additional trouble and expense. Glycerinated bile is now used mainly to give a passive immunity similar to serum, until the infection in the herd, or in the near neighbourhood, has died out. If necessary it may with advantage be followed by a dose of pure bile. It is now rarely followed up by virulent blood, principally on account of the danger that exists in this country of communicating other diseases besides Rinderpest. The chief advantage of glycerinated bile over serum is that it can be prepared immediately on the outbreak of the disease, at any centre where serum is unobtainable. It will keep effective for many months—in one instance it proved effective after three years—and it requires very little skill to prepare it.

The question of defibrinated salted blood and serum as inoculating media for the prevention and cure of Rinderpest are also dealt with at length, and the pamphlet concludes with the following:—

CONSIDERATIONS FOR FUTURE ACTION.

Should Rinderpest become epizootic again in South Africa, and prevail in a virulent form over wide areas of the country, rendering the cattle liable to infection, and re-infection for many months, it would be necessary to give the herds an active immunity which would last until the danger were past, and such an immunity could only be conferred by an injection of one or other of the following immunising materials:—

- (a) Inoculation with pure bile.
- (b) Inoculation with glycerinated bile followed by pure bile, or repeated doses of virulent blood, or
- (c) The simultaneous inoculation with strong standardised serum and virulent blood.

There are, however, very strong objections to the use of virulent blood, whether after glycerinated bile, or along with serum,—

- (a) Because it conveys active Rinderpest to the cattle, every inoculated herd becoming a fresh centre of infection, and
- (b) On account of the danger of introducing other infectious diseases besides Rinderpest, such as Redwater, Anthrax, Quarter-evil, and other diseases of a similar character which affect cattle in South Africa, not yet clearly differentiated, but which are known to be communicated by blood inoculation, and which cannot always be guarded against even by careful microscopic examination.

This is also the principal objection against the use of defibrinated salted blood.

We have, however, every hope and expectation now that the war has ceased, and with it the necessity for moving cattle about in all directions for transport, and protection, that the outbreaks of the disease will be more or less sporadic, and comparatively easily suppressed by strict quarantine, and the prompt inoculation with serum or bile, both pure and glycerinated. It is upon serum, however, that our principal reliance must be placed,—

- (a) Because it can be produced in large quantities, and kept for long periods ready for use as required. The serum prepared by Drs. Turner and Kolle at Kimberley in 1898 retained its efficacy unimpaired for two and a half years, and some of it was used effectively after three years, but its strength was evidently becoming reduced at the latter date.
- (b) Its strength can be ascertained before it is issued for use, hence the dose can be regulated.
- (c) Its action is immediate, a clean animal is safe as soon as it is inoculated.
- (d) It is also curative in its action in the early stages of the disease when used in large doses.
- (e) It does not—as far as is known at present—communicate any other disease.

The methods of inoculation which I would recommend in future sporadic outbreaks of Rinderpest are briefly as follows:—

INFECTED HERDS.

These should be inoculated at once with either serum, glycerinated bile, or defibrinated immune blood. Every animal which indicates infection by a rise of temperature should receive a large dose of not less than 100 c.c. of strong serum, 30 c.c. of glycerinated bile, or 300 to 400 c.c. of ordinary immune blood, obtained from a recovered animal which had not been fortified. All affected animals should receive the inoculation direct into the jugular vein, as it acts more promptly and effectively than when injected under the skin. Fresh pure bile should not be used in an infected herd, if any of the other inoculating materials can be obtained, as some biles tend to intensify the character of the disease in those already infected, and its immunising effect is too slowly developed to protect the healthy cattle in the herd against infection, if they are kept in contact with the sick. If no other means are available, however, the temperature of the whole of the cattle in the infected herd should be carefully taken by clinical thermometer, and those only which register a normal temperature should be inoculated with pure bile; the others should be separated from the inoculated lot at once, and carefully attended to. If glycerine can be obtained, the spare bile should be mixed with it in the proportion of *one* of glycerine to *two* of bile. This mixture after standing for forty-eight hours, may be injected intravenously into the infected animals in large doses, not only with safety, but with marked benefit. Fresh, pure bile may, however, be

used as a second injection, following serum or glycerinated bile, in all animals in the herd which give no indication of being affected with the disease; this will confer a lasting immunity sufficient for all practical purposes.

CLEAN HERDS.

When it is decided to inoculate a clean herd which is in danger of becoming infected by reason of the proximity of the disease, I would recommend that all the cattle in the herd be inoculated with not less than 20 c.c. of glycerinated bile, 30 c.c. of strong serum, or 200 c.c. of defibrinated immune blood. The strength and endurance of the immunity conferred by these inoculating materials is proportionate to the amount injected, hence, if the disease is prevalent in the neighbourhood, larger doses may be used, or an injection of fresh, pure bile may be given ten to fifteen days later. This will confer a lasting immunity on the cattle, and obviate the loss arising from the inoculation, or risk of introducing the disease.

HEARTWATER IN CALVES.

Further Experiments.

INTERESTING CONCLUSIONS.

(By MR. C. P. LOUNSBURY, Government Entomologist.)

An experiment to further test the supposed identity of the disease produced in calves by heartwater-pathogenic ticks with heartwater has just been completed. In the last issue of the *Journal* the infection of calf 5 by pathogenic ticks was recorded, and also the fact that a goat inoculated with blood from this calf had become infected. While the goat was in fever its blood was used to inoculate the animals for the new experiment. These animals were three in number and were done July 29th, each with 5 c.c. injected into the jugular. One was LXXXIII, a merino ewe that had been kept in the calf shed as a control throughout the period of the earlier experiments. Another was LXVIII, a merino wether that had in early May experienced an attack of fever due to inoculation from calf 2, and which had subsequently resisted infection from heartwater-pathogenic ticks. And the third was LXV, an angora ewe that had survived true heartwater last year under

Veterinary Surgeon Spreull's manipulation at Somerset East, and which had subsequently proved resistant to heartwater both when tested by virulent blood and by pathogenic ticks. All three animals were originally from non-heartwater sections of the country. If the perplexing disease induced in the calves were altogether distinct from heartwater, it is reasonable to assume that both LXXXIII and LXV would suffer severe attacks as the result of their inoculation, whilst LXVIII, because of its previous attack, would be little affected. On the other hand, if the disease were heartwater, only differing from the typical malady in the superficial lesions it caused, the expectation would be that LXXXIII only would be acutely affected.

Four weeks have now elapsed since the inoculation and no further developments need be looked for. LXXXIII, as was expected in any case, sickened and died. Fever appeared on the tenth day and subsided on the eighteenth. Then after lingering on in a wholly prostrate condition for another week, the animal succumbed. Neither LXVIII nor LXV were made visibly ill. The former gave a slight febrile reaction from the eighteenth to the twenty-second day, whilst the latter gave only a single temperature reading that was abnormally high. Therefore it appears that an attack of the calf disease confers resistance to heartwater, and, conversely, that an attack of heartwater confers resistance to the calf disease. This is as near to proof that the diseases are one and the same as is likely to be obtained. A supplementary test to show that the ticks of the lot used for the infection of the calves were non-pathogenic until fed on heartwater diseased goats is now in progress. No doubt of their innocuousness is felt, but a positive demonstration of the fact is desirable.

M. Laveran in the *Comptes Rendus* claims to have discovered an antidote to the bite of the tsetse fly so fatal to cattle on the East Coast. He maintains that injections of human serum have the effect of making the trypanosomas (the causative micro-organism) disappear from the blood of the sick beast. Apparently the substance in the human blood which kills the microbe of the disease is contained in the white globules. Four to five hours after the human serum is injected the trypanosomas begin to disappear, as they do under treatment with arsenite of soda. From trials on rats and mice, the human serum only drives away the microbes for some days, and another injection is required to prolong the life of the animal. Repeating the dose, however, becomes ineffectual at length, and then a mixed treatment of arsenite of soda and serum is advisable. The dose of serum for a rat is about two cubic centimetres, and hence the antidote is not very applicable to cattle, but M. Laveran hopes to immunise animals against the malady, and perhaps serum will act as a remedy.

THE METRIC SYSTEM.

A Plea for Decimal Coinage and Metric Weights and Measures for South Africa.

A PAPER READ BEFORE THE PHILOSOPHICAL SOCIETY OF CAPE TOWN
BY MR. D. E. HUPCHINS, F. R. MET. SOC., CONSERVATOR OF
FORESTS, WESTERN DISTRICTS, CAPE COLONY.

For over 100 years Englishmen have been looking over the cold waters to the good things beyond, but they have hesitated to take the plunge. Decimal Coinage and Metric Weights and Measures are among those good things that are only attained after effort and inconvenience. The last 100 years have been prosperous for Englishmen and Americans, hence the wish to let well alone. Of course America has Decimal Coinage everywhere. History shows that the introduction of a decimal system generally requires some national crisis to brace the country to the effort. Thus the French Revolution was necessary for the inception of the decimal system of coinage and measurements. It was not until after the struggle for German unity that Germany adopted it, or till the achievement of Italian unity that Italy adopted it generally. The younger nations such as Belgium adopted it as a matter of course when they achieved national existence. Small States such as Holland and Denmark had to adopt it because their bigger neighbours did so. It was as far back as 1793 that the French National Convention promulgated the metre as the unit of measurement. In the reaction that followed, the decimal division of the right angle into a hundred degrees instead of ninety, and other unimportant points, were abandoned, and for about a quarter of a century in France the metric system and the old system of weights and measures were practised together. At last in 1837 the metric system was made obligatory in France, and from that date to this there have been no more enthusiastic advocates of the metric system than the French. The Germans did not introduce the metric system till 1869, but, says a recent British Consular Report, "The new system has taken complete root in German commercial life, and its utility has been fully demonstrated."

The metric system began in Italy in Napoleon's time, but it was not till 1890 that the system was universally legalised. In Austria the metric system has been in compulsory use for the last quarter of a century, and, says the same Consular Report, "has given complete satisfaction. Not the smallest desire is evinced in any quarter to

revert to the old and more cumbersome system." Hungary, Japan and Belgium adopted the decimal system with their new national life as a matter of course; but in quiet Holland, though the metric system has been in force for over 80 years, it is not yet fully followed. In Portugal there was a transition stage of 10 or 12 years during which the people gradually got accustomed to the metric system. In Spain, Sweden, Norway and Switzerland the metric system is legalised, and even in Turkey endeavours have been made to do so. All these countries have decimal coinage. Russia and China have decimal coinage, but not metrical weights and measures. If one runs the eye down the forty principal nations of the world, we see that they have all got decimal coinage except England (including India), Persia and Tunis!

The Consular Report mentioned above states that the adoption of the metric system has assisted in the development of the trade of the countries which have adopted it.

The question of decimal coinage is now before a committee of the Federal Parliament of Australia, and with the re-construction of the States of South Africa the present appears to be a fitting time for the Philosophical Society (the only general scientific society of South Africa) to consider this most important question and to make a recommendation on the matter to the various South African Governments.

I shall now proceed to lay before you suggestions regarding the feasibility of a working decimal coinage and decimal weights and measures for South Africa. In a complete metric system there are points which have an interest for scientific men alone. These there is no necessity to discuss this evening. Scientific men use the metric system the world through, but the really important question from a humanitarian point of view is the use of the metric system by the people. Here there are difficulties to be overcome, prejudices to be swept aside, but there is the greater reward afterwards—a proportion of our manhood freed from the slavery of the desk, and the terror of figures banished from women and children.

DECIMAL COINAGE.

To consider a decimal coinage first. This is really the most important part of the subject for us all, far more important in the daily usages of life than all other weights and measures put together. Thus we find that whereas a few of the nations have not yet adopted metrical weights and measures, every civilized power, with the exception of England and some of her Colonies, have adopted a decimal coinage.

It has been argued that the adoption of a decimal coinage in England would be difficult because either the pound, the great unit of the wealthy classes, or the penny, the poor man's coin, must be displaced. Now we have the singular good fortune in South Africa to be able to avoid this difficulty. With us the penny is of no account as a circulating medium away from the coast ports, and even

there the system that I have now to propose to you does not materially disturb the penny. In fact we have a decimal coinage in our pockets to-night, and all that is required is to instruct the people in its use and adopt it. We have the pound; we have the florin, the one-tenth part of the pound; and we have the tickey, which is nearly the one-tenth part of the florin. The present farthing is the $\frac{1}{96}$ part of the florin. The decimal farthing would be the $\frac{1}{100}$ part of the florin. I suggest that our decimal coinage in South Africa should consist of pounds, florins, tickeys and farthings. The pounds and florins remaining as they are, let us see how the tickey is affected. Instead of having a face value of threepence, it would have a face value of a trifle below twopence halfpenny—2.4 pence. Its real value, as everyone knows, is much below this. For many years all our coinage below the gold coins have been tokens. We should then have a new tickey of which the face value would be twopence halfpenny.

The place of the penny would be taken by the half-tickey, of which the value would be one penny farthing. For those with whom home associations are so justly dear, it may be worth remembering that a decimal penny's worth (viz., one penny farthing) would come nearer the home value of the penny.

The halfpenny is little used in South Africa. Under the decimal coinage proposed, its value would be increased by less than half a farthing. Practically, therefore, it would remain unchanged. Thus, as I said, we have a decimal coinage already in our pockets, and all that is required is to keep our accounts in pounds, florins and tickeys instead of pounds, shillings and pence. The change is so simple that it would probably be sufficient for the Governments of Natal and the Cape in communication with the Chambers of Commerce to adopt it forthwith.

As regards the coins at present in circulation, there would be a nominal loss of $\frac{1}{2}$ d. on the tickey and nominally a gain of a farthing on every penny, but, as has been mentioned, there would be no real loss or gain on either, since the florin and all the silver and copper coins have no real value, but only, like a paper note, their exchange value at the bank. Indeed, silver and copper coins are at a disadvantage compared to paper money, since silver is not legal tender above £2, nor copper coins above five shillings. In this proposed decimal coinage, the shilling would of course remain as it is, "the shilling or half florin"; the sixpenny bit would remain as it is, "the sixpenny bit or quarter florin."

The Colonies of Mauritius and Ceylon furnish good parallels for what is here proposed for South Africa. By commercial relations they are linked to India as South Africa is linked to England. Mauritius and Ceylon have taken the Indian standard coin (the rupee), but instead of following the clumsy Indian division of the rupee into 16 annas and 12 pies, they divide it into 100 cents. I have resided for some years in the East, and know that this system has long worked perfectly successfully in Ceylon. Some day

probably India will follow suit. Here we have, on the one hand, a very ancient civilisation intensely conservative and very difficult to move in the matter of its coinage; and on the other hand a young Colony linked to it, but with work to perform, and no spare population, or time to waste on childish arithmetic. Personally for many years I have been in the habit of reckoning in pounds, florins and tickes for rapid mental calculations.

The florin was originally a large and valuable gold piece struck by Florence when in the zenith of her power. The name is derived either from Florence or the flower, a lily that appeared on one side of the coin, which is described as of great beauty. This florin was speedily imitated all over Southern Europe, and from it is derived the Austrian and English florin of to-day of which the value is 2s.

Other British Colonies have their decimal coinages founded on the most convenient local standard. Thus Canada has dollars and cents. The Straits Settlements and Hong-Kong have a dollar and cents. The dollar was authorised in 1894 by a British Order in Council, and is identical in weight and fineness with the Japanese dollar or "yen." British Honduras has a dollar and cents, the dollar being the United States gold dollar. Mauritius and Ceylon, as we have seen, have the rupee and cents.

WEIGHTS AND MEASURES.

Weights and measures in the transactions of daily life have not the importance of coinage, but it does not require a moment's reflection to see that when Englishmen have different standards of weights and measures to the rest of the world, and those weights and measures not simple and easy, that Englishmen are at a disadvantage until they reform their weights and measures. At the same time, for those of us who are long past our school days, the shattering of our old-established standards of length, of area, of capacity, and of weight is a terribly awkward thing to contemplate; and it will probably be necessary for us, as has been the case with most countries, to go through a transitional period and lead up gradually to the change. However, that is a point on which I hope the Society will express its opinion this evening. I shall now place before you a scheme by which perhaps we may achieve the metric system of weights and measures with a minimum of inconvenience in the alteration of our standards of thought and speech. I shall consider in succession units of length, of area, of capacity, and finally of weight.

UNIT OF LENGTH.

The mètre or meter is the foundation of the metric system. Captain Kater in the *Philosophical Transactions* for 1818, page 109, gives 39.3707904 as the number of English inches in the standard French mètre. The standard metre is of platinum at the freezing point of water. The Standards Commission in their report of 1871-72 recommended a value of 39.38203, but the English Act adopted

Captain Kater's value. The value provisionally adopted by the U.S.A. Geodetic Survey is 1 metre=39.3700 inches—Smithsonian Met. Table. The English standard yard is of bronze at 62° Fahr. As a mnemonic, it may be worth remembering that the French mètre equals 3 feet 3 in. and $\frac{1}{2}$. This then is the relation between the English standard of length and the French length standard, which is the basis of the entire metric system. After all, the difference between the French metre and the English yard is not very much. It would probably be better if instead of speaking of the metre or meter, which has a number of other meanings in English, we were to speak of the "old yard" and the "metric yard." For the ordinary purposes of daily life, the transition from the one to the other is not difficult. It is in the subdivisions that the wrench comes! Feet go out, inches go out, and in their place we have centimetres. Two and a half centimetres equal very nearly one inch. Centimetres from their use by foreigners and scientific men have already got to be fairly familiar with most Englishmen. Centimetre guns and inch guns are at this moment fighting our battles side by side. Perhaps it might tend to popularize centimetres if they were called metric inches. When a serious attempt is made to introduce metrical weights and measures, we shall no doubt see more of the foot rules with inches on one side and centimetres on the other.

The big unit of length is the mile. The corresponding metric measure is the kilometre. Kilometres have already got a footing in South Africa on the railways in the Transvaal, and let us hope that we shall soon see all the road distances expressed in kilometres. There should not be much difficulty in this change. The kilometre or 1,000 yards is the natural long distance measure. Three-fourths of the people who speak about miles, if suddenly asked what it meant could not tell you that it represented 1,760 yards.

AREA.

The metrical unit of area is the hectare or 10,000 square meters. Nothing can be more natural as a unit of area than this. The hectare is 100 metrical yards square, *i.e.*, just about a good stone's throw square, an easily grasped and an easily intelligible quantity. Now let us see what it is. The hectare equals 2.471 English acres, and this would be an awkward transition, but in Cape Colony the acre is not the legal unit of area; the Cape unit of area is the morgen, which equals 2 $\frac{1}{2}$ acres. So that when we go from morgen to hectares we have very little change to make. 100 ares go to a hectare.

CAPACITY.

The metrical unit of capacity is the litre, sometimes anglicised into "liter," which has more of a doggy or an untidy sound than a scientific one! It is simpler to talk of a metrical quart, and then we know where we are. Here is an ordinary quart bottle and here is a

litre of water ; the ordinary quart holds $\frac{1}{2}$ of a litre more or less. In the trade there are reputed pints and legal pints, reputed quarts and legal quarts, both the legal quarts and legal pints being considerably larger than common quarts and pints. The litre is $1\frac{1}{6}$ legal pints. Practically in this country the bottle is the only liquid measure of capacity with which we need concern ourselves. Not only are all alcoholic liquors measured by the bottle, but milk also. The quart bottle is in fact our standard liquid measure ; so here again, we have only to take things as we find them and define the metric quart as equal to one litre.

Ten metric quarts will then equal one metric double gallon or bi-gallon, and 100 metric quarts will equal one metric muid.

This metric muid will measure $2\frac{1}{2}$ bushels, which is perhaps nearer the size of the common muid sack of grain than the three bushels it is supposed to contain.

The exact value of the metric bi-gallon is 2.20096 British gallons ; of the metric muid of course 22.0096 British gallons or 2.7512 bushels.

For very small measurements the "c.c." or cubic centimetre is used. This is the thousandth part of the litre. The small measure in my hand, holding little more than an egg-cupful, represents 50 c.c.

WEIGHT.

The metrical unit of weight is the kilogram, shortened commonly to the "kilo." The "kilo" equals 2.2046 lbs. Thus the lb. and the half kilo are practically synonymous. Those who have lived on the continent of Europe will remember that the adoption of the kilo causes no inconvenience whatsoever. You may ask for a pound of tea or a half kilo of tea, as suits your fancy. Below the kilo we have in common English weights ounces and grains. Ounces we all know, but grains very few of us know, since here we get mixed up with Apothecary's, Troy, and Avoirdupois weights. Thus we more usually speak of fractions of an ounce than so many grains, which is not altogether satisfactory. In the metric system all this becomes simple. The gram is the one-thousandth part of the kilo, and it becomes the unit of weight for all small measurements. In value it is a trifle over one-twenty-eighth part of an ounce. (Ounce=28.3495 grams.)

Our big unit of weight is the ton. Here we have all sorts of tons in common use. In America, in South Africa, and in Australia the ordinary ton for all heavy goods is 2,000 lbs. In England it is 2,240 lbs. The Cape merchant buys with a 2240 lb. ton ; he sells to us by a 2,000 lb. ton. The metrical ton of 1,000 kilos contains 2204.62 lbs. Thus the metrical ton is in the happy position of being an intermediate between the Colonial and American ton of 2,000 lbs. and the British ton of 2,240 lbs., which it more nearly equals.

A ship's ton or 40 cubic feet is a measure of capacity, so we need not trouble to consider that, except to mention the curious fact that up

to as late as 1835 ships were measured by assuming that their depth was equal to their breadth. For some years after 1835, and indeed we see it still on tables, there were tons O.M. (meaning old measurement) and the new or legal tons. I believe O.M. tonnage is still used for yachts. The original "tun" was a cask of a certain size holding about 2,000 lbs. of water or wine.

A METRICAL SYSTEM FOR SOUTH AFRICA.

The following table shows the form which I suggest that metrical weights and measures should assume in this country:—

Coinage: £1=10 Florins=100 Tickeys=1,000 Farthings.

Length: 1 Kilometre=1,000 Metric Yards or Metres=100,000 Metric inches or centimetres.

Area: 1 Hectare (10,000 Met. Square Yards)=100 Ares.

Capacity: 1 Metric Muid, Hectolitre or Décistère=10 Bi-gallons=100 Metric Quarts or Litres=100,000 c.c. or Cubic Centimetres.

Weight: 1 Metric Ton=1,000 Bi-Pounds or Kilograms=1,000,000 grains.

It may be noted that Deca (10), Hecto (100), Kilo (1,000) and Myria (10,000) are the names for the multiples in the metrical system; and that Deci (10), Centi (100) Milli (1,000), are the names for the divisions in the metrical system.

Also that approximately 100 francs=£4.

And approximately 10 centimetres=4 inches.

The point that I have set before myself in compiling this table is popularization. I have endeavoured to get into line with the metric system the common weights and measures of our daily life. It has struck me that in attempting to introduce the whole metric system in its French dress, we are perhaps attempting too much and court- ing failure. One can imagine a farmer taking readily to a metric muid, but he will not easily be persuaded to adopt a décistère. In Germany after 1872 metric reform was adopted straight away with a thoroughness quite Japanese. The milestones were pulled up and kilometres put in on the roads all through the country. French nomenclature was avoided as much as possible. The millimetre is also called strich; the centimetre neu zoll; the metre stab; the litre kanne; the half litre schoppen; the half kilo pfund. The centner is 50 and the tonne 1,000 kilos. I notice that Germany, Holland and other countries in introducing decimal weights and measures have done so by adjusting existing standards rather than by introducing a new set of standards. Within certain limits weights and measures can be adjusted without troubling anyone, thus the Americans use British weights and measures, but they are differently standardised. Thus their weights and measures are practically the same as ours, but have different absolute values.

DECIMALS ALREADY IN USE.

Where we have a standard and decimals in actual use as is the case with inches and cents in meteorology for the barometer and for rainfall, the necessity for reformation is only seen when we come to compare our work with foreign work, and it might be argued that it is easier to convert with tables, as occasion requires, than to disturb existing standards. Perhaps this consideration appeals to us most strongly in the case of the thermometer. Is it necessary to abolish the Fahrenheit scale for the thermometer? The Centigrade scale is no doubt more logical. It takes the range of temperature between the freezing and the boiling point of water, and divides that into a hundred degrees, but it has the disadvantage of introducing minus degrees as soon as we get below the freezing point of water, which is a common enough temperature even in South Africa. The Fahrenheit thermometer is in practice better than it was intended to be by its designer. A more important point for us in South Africa with its varying altitudes, than the boiling point of water, is the temperature of our bodies, and this is nearly 100° on the Fahrenheit scale, 98° to $98\frac{1}{2}^{\circ}$. Birds go to 100° or over. It is a distinct convenience, as we rise towards this critical point in habitable climates, that it should be expressed by nearly 100. The Fahrenheit degree, too, is a more useful one than the Centigrade degree. It is smaller, and for ordinary meteorological work with temperatures, requires no fractions. The necessity for change in these already existing decimal standards is demanded solely on the ground of scientific uniformity. Their case differs considerably from that of the confusion and waste entailed by our coinage and our common weights and measures.

CONFUSION NOW EXISTING IN SOUTH AFRICA.

In the Government Departments of this country, there is a complete absence of uniformity in weights and measures. The Chemical Department (the Government Analyst's) use metrical weights and measures. The Railway, the Public Works Department, the Forest Department, and most of the Government Departments use English weights and measures. But the Department that has most to do with measurements, *i.e.*, the Surveyor-General's Department, uses a mixture of English and of antiquated Cape measures. It will hardly be believed that land surveyors in South Africa use one set of measures for horizontal distances and another set of measures for vertical distances. Thus length is expressed in roods, equal to 12.396 English feet, areas are expressed in morgen (morgen = 2.117 acres), but vertical heights are expressed in English feet, and scales are usually constructed at so many roods to the English inch! The so-called Cape feet appear on chains and tapes sent to this country, and occasionally cause trouble and confusion, but I believe the Cape foot has fallen happily into complete disuse. It equals 1.033 English feet.

COLONIAL ACTS REGULATING WEIGHTS AND MEASURES.

Colonial weights and measures are regulated chiefly by Act 11 of 1858 and Act 15 of 1876. The first of these Acts repeals previous laws on the subject, and abolishes the use of the Dutch measures "Ell," "Old gallon," and "Schepel," substituting English pounds, yards, gallons and bushels, the bushel being equal to eight gallons. In the weight part of the Act, it is noticeable that there is an approximation to a decimal system. The pound is provided as the only standard of weight. Other weights used in the Colony are only legal so far as they are authorised fractions or multiples of the pound, and these fractions or multiples of the pound are defined in the Schedule of the Act. Six vulgar fractions are enumerated, and then occur the words "and every decimal fraction of a pound." Section 9 of this Act provides that all bargains where weight is concerned made by the hundred unless otherwise specified, shall be deemed to be 100 pounds. Thus the ounce is only legal weight as the sixteenth part of a pound. The word "ounce" does not occur in the Act.

Act 15 of 1876 has to do with assizing and the safe keeping of the standards. It is provided that standard weights and measures shall be preserved in the Treasury, and certified copies forwarded from time to time to Municipal Clerks.

In 1895 we have a further enactment of decimal weights. Act No. 33 of 1895, the Public Markets Act, enjoins the sale per hundred pounds of cereals, market produce, and dried fruits, whenever the quantities are above 50 pounds at all public or Municipal markets. In introducing this Act, Mr. Willmot stated that conferences of the Chambers of Commerce had three times urged this measure.

RECOMMENDATIONS.

I recommend that decimal coinage should be introduced forthwith. We want all our manhood to develop this country, not to waste it in childish arithmetical sums. No doubt the banker and accountant will smile at this remark. To them pounds, shillings and pence are second nature, and to them the mental effort involved in their use is inappreciable; but nevertheless that mental effort exists, and represents so much wasted nerve power. As I have remarked, we have the decimal coinage already in our pockets. All that is required is the small effort of keeping our accounts in pounds, florins and tickeys instead of pounds, shillings and pence.

With metrical weights and measures, the position is not quite the same. Though in the scheme that I have sketched above the alteration of existing standards may be considered to be reduced to a minimum, it nevertheless exists, and it may be advisable to ask Government to legalise the optional use of these weights and measures now, and to fix a period, say in two years, when they shall become obligatory, they in the meantime forming a prominent feature in the instruction imparted in Government-aided schools, and in the papers set to candidates for admission to the Civil Service.

As I began by stating, a decimal coinage is now under the consideration of the Federal Parliament of Australia, and I learn from the last report of the British Decimal Association that the introduction of metrical weights and measures is taking practical shape in England and Canada. In England, by an article introduced into the code of elementary schools in 1900, instruction in the principles of the metric system is made obligatory in the upper standards. The same practice prevails in Cape Colony.

In the United States of America a Bill for the obligatory use of metrical weights and measures in Government Departments has been under consideration, if it has not already been passed. Most of the scientific departments in America have voluntarily used decimal weights and measures for some years past. I may instance the "Coast and Geodetic Survey of the United States and Canada," and the meteorological publications in part.

In Johannesburg I understand that metrical weights and measures are in general use among the mining engineers.

Let me conclude with a short quotation from Lord Rosebery's weighty words spoken at Chatham after the dark days of nearly two years ago. He said: "We ought to get another advantage out of this war if we learn to live less from hand to mouth. We do not proceed by scientific method. We go on the principle that things have carried on so well so far, that we are a noble nation, that we are rich, that we are pretty numerous, and that we shall muddle out right in the end. And indeed with our love of liberty, and with our free institutions, it is not a very easy matter to get things placed on a scientific or methodical basis. What with the obstruction in Parliament, what with the obstruction of privilege, what with the obstruction of prejudice, the difficulty of getting any reform carried through is so great that Governments as a rule prefer to patch up and botch up any immediate difficulty that may be presented in our organisation, and pass on until some worse difficulty faces them. I do not deny that we are as great a nation as any of our loud patriots may declare us to be. I will certainly not yield to any of them in my belief of our qualities and of our destiny. But I say this, that *we are a people of enormous waste. We waste simply by not pursuing scientific methods.* I do not like to compare us with Germany, but without taking as a model Germany or any other country, I believe if we wish to take full advantage of the lessons of this war after it is concluded, we must be more scientific in our methods. In commerce, in education, and in war, we are not methodical, we are not scientific, we are not abreast of the more advanced nations of the day; and if we want to keep our place we shall have to consider the lessons we have been taught in this respect. You will have, when this war is over, to put your Empire on a business footing.

"We must consider deliberately, patiently and scientifically the methods by which we have been accustomed to proceed, and see in what way they have fallen short, and determine to reconsider and revise them."

TRIAL OF PERUVIAN MEALIES.

CUZCO MAIZE IN SOUTH AFRICA.

UNSATISFACTORY EXPERIMENTS.

Early in 1901 the attention of the Secretary for Agriculture was drawn to the vast superiority of Cuzco maize, which is claimed to be about the finest maize grown in the world. In its native soil, the Southern Highlands of Peru, it makes a wonderful growth and is marvellously productive. The plants grow there to a length of about 14ft. The farina produced from this grain is said to have a very delicate flavour and to differ very considerably from that of ordinary maize.

With so much to recommend it a sample shipment was ordered and distributed for trial over different districts in the Colony. To give it a fair chance, nearly all the mealie districts were entrusted with seed, but in no case, as will be seen from the appended reports, did success attend the experiments. Appended are the reports in detail.

WESTERN PROVINCE.

The Officer in Charge Government Wine Farm reports 21st May, 1902:—I beg to report that the maize was an utter failure. It came up all right, but was destroyed by the ladybirds, with the result that not a single cob was obtained from the 11b. of maize sown.

The Superintendent, Porter Reformatory, Tokai, reports 10th May, 1902:—With reference to your letters Nos. F. 649 and F. 3247 of the 13th September, 1901, and 3rd instant respectively on the above subject, I beg to report as follows:—These mealies were planted on the 16th October, 1901; $\frac{1}{3}$ of the quantity of the seed was planted with a moderate quantity of stable manure, $\frac{1}{3}$ of the seed was planted with a light dressing of stable manure and a small quantity of guano, the remainder was planted without manure or guano, but in good soil that had previously been planted with potatoes.

They were planted 5 feet apart each way, the stems grew to a height of 10 feet, but only about 10 per cent. of the stems produced cobs, and these were very poor and badly developed with just a few corns on each cob.

As far as my experience goes this variety of mealie is a miserable failure in this climate.

I might mention that alongside the Cuzco mealies I planted some of the ordinary mealies under exactly the same treatment and they gave a splendid crop, some of the stems having 4 cobs each.

The Principal, Agricultural College, Elsenburg, reports 5th May, 1902:—With reference to your enquiry regarding the trial of Cuzco maize I regret to report that the test was an entire failure.

In the first place only about one-fifth of the seed germinated, what was left was very badly attacked by the "mealie grub" and not a single head came to maturity.

In fact I very much doubt if they would have ripened under more favourable conditions, and I am of opinion that this district is not sufficiently warm for their proper maturation.

EASTERN PROVINCE.

The District Forest Officer, King William's Town, reports 7th May, 1902:—These mealies have not proved a success at any station. At Cathcart and Tamacha germination was poor and the growth very irregular, and crops almost nothing.

At Fort Cunynghame germination was poor, the plants which did grow were much taller than ordinary mealies and consequently more easily damaged by wind and hail; most of them carried no crop, and the few which have one or two cobs are not yet mature. Only a few seeds will be got.

The District Forest Officer, Keiskama Loek, reports 26th May, 1902:—In terms of your memo. No. B. 12. 308. of the 6th instant, and previous communications, I have now the honour to report as follows on the experimental sowing of the 8 lbs. 10 ozs. of Cuzco maize supplied to me in September last.

In the middle of October I measured off sufficient ground for the maize. I had it well ploughed. The soil is a rich deep clayey-loam, on the right bank of the Keiskama stream near to, but down stream from St. Matthew's Mission Station, and nearly opposite where the Gwiligwili flows into the Keiskama.

It is admirably adapted for the growth of our ordinary Colonial "German Mealie."

The safest time for sowing the ordinary mealie in these parts is from 1st November to, say, 25th of December. Sown earlier it is

likely to be attacked in stalk and cob by "worm." Sown later it runs some risk of being caught by an early frost. The best results have invariably almost been obtained from sowings in November and December.

But in seasons such as we have been experiencing for some years past the rains have to be taken advantage of, be they earlier or later.

We had heavy rains in the end of October, and the ground was only in a fit condition for working on the 9th November. The grain was divided into two equal portions, and half was planted, the ground being first harrowed down. The maize was dibbled in 4 inches deep in rows 3 feet apart, and 3 feet from grain to grain. The soil was in good order.

This lot came up irregularly and some of the plants were eaten off by the grub.

Ten days later the other half was planted in a similar way, the ground having been harrowed as before. A spell of great heat followed. Hardly any of this germinated. The grain was eaten by insects in the ground.

The first lot planted did not come on well. The plants took on a sickly, ragged appearance. Some died right back and some were eaten off by grub. About this time there was about 1 plant to every 3 square yards of surface. I had them well scuffed. They made but poor headway. There was no vigour in them.

At 2 feet 6 inches to 3 feet in height their tops withered off. I cut a few back to the surface of the soil. These soon threw out new shoots and looked as if they were going to do better than the originals.

They ultimately came into blossom with healthy looking pollen. There were few indications of the formation of cobs, and such as gave any indications never got any further.

The plants that were left to themselves died back to the soil level and from there shot out again. A few are now growing with apparent vigour, as if they just only recently understood what was required of them. They are now in full blossom. Cobs, apparently, are also forming in a regular way. The first frost, which must now be close upon us, will, of course, kill them off.

Taking results generally, for the season just over, there is nothing strange or unusual in what I stated above. A great proportion of the ordinary maize sown has failed entirely, and in much the same way. A great deal of the "Kaffir Corn," too, is only now in blossom and will of course never be reaped. When we did get rain here, we got it in buckets full, and it battered all clayey soils into a paste, which the sun immediately baked into the consistency of brick. In such instances (and there were many) until too late, neither hoe nor cultivator could be put to work.

To break through the crust at such a time with the hoe meant the killing outright of the feeble plants whose roots were encased in it, and only the hand-hoe could do it. Rain had to be waited for. It

came too late. The original plants had died back, but after the first rain new shoots made their appearance from the old stalk, at the surface of the soil, and these are what is now in blossom.

The District Forest Officer, Kologha, reports 2nd June, 1902:—In terms of the request contained in your letter No. B. 12. 282, dated the 6th ultimo., I have the honour to report as follows:—The supply of Cuzco maize received from Fort Cunynghame was planted here in good garden soil, carefully prepared. The sowings took place on three different dates, i.e., 14th, 17th and 23rd October, 1901. Only 50 per cent. of the plants germinated and had a very weak and slender appearance. They were scuffed on several occasions. In December 1901 they were attacked by grubs to such an extent that not 5 per cent. escaped. The roots appeared to be insufficient to support the stem, and to keep them upright they had to be earthened up. Only one specimen reached a height of eight feet; the average height was not above an ordinary crop of the common mealies. They were planted three feet apart.

Many plants flowered before the cob had been sufficiently developed to be fertilised. Those that developed cobs and appeared to be fertilised were entirely destroyed, as were other crops of mealies in the immediate neighbourhood by a severe hailstorm on the 21st February, 1902; the hailstones in many cases were 4½ inches in circumference.

The result therefore of the experimental sowing is an entire failure.

Small supplies of seed were given to several foresters to try at their stations, but on the whole these have all failed.

Detailed reports have not yet come to hand.

THE TRANSKEI.

The Conservator of Forests, Umtata, reports 2nd July, 1902:—With reference to the Cuzco maize received in October last, I have the honour to report that experimental sowings were made at every forest station in the Conservancy. The results have been disappointing and no seed whatever has been grown, excepting very small quantities at Insikeni (Umzimkulu) and at Kokstad. The sowings were made under all the varied conditions of soil and climate found in these territories, and reports of failure have come in from all points. The season generally was not favourable for mealie cultivation. At very many centres the ordinary crops suffered severely from attacks of grub, whilst at the coast stations locusts have done much damage. The Cuzco maize appears to be peculiarly susceptible to grub attack, which, in the report of one forester, is accounted for by the unusual sweetness of the stems.

Germination seems to have been very good everywhere, and the opinion is expressed in most of the reports that sowing should have been made early in the season. The great height to which the Cuzco

maize grows renders it very liable to wind-break. A sheltered situation is necessary, and even there the roots require to be carthed up.

Failure was complete on the coast stations at St. Johns, Gwaleni, Cwebe and Dwessa, where the ordinary mealie of the country yields good crops. The Cuzco maize is reported by two foresters to be too soft for coast conditions, which are stated to be most suitable for a hard mealie.

In spite of these failures I would recommend that a further attempt be made to cultivate the maize. The experience gained in a very bad season has been of undoubted value, and in a favourable season, free from all consuming grub, I think that in certain districts there would be reasonable hopes of success.

The District Forest Officer, Kokstad (Mr. Ross), has taken great interest in the matter, and I append his remarks on the personal observation of a small patch of maize in the garden attached to his quarters.

Mr. Ross says:—"From the above results it will be gathered that the experiment has, in a wide sense, been a failure. It is pretty clear that Cuzco maize will not stand the very ordinary system of cultivation in vogue for similar crops in this territory. The chief essentials would appear to be, (1) a good, rich soil, (2) shelter from strong winds, (3) constant cultivation, and (4) water for the purpose of irrigation. From personal observations, it would appear that the plant, or rather the cob, is sensitive to overhead moisture; a number of cobs in this garden appeared to be affected by mildew. The maize is shallow rooted and requires earthing up in the manner practised in the cultivation of potatoes.

In order to avoid early frosts planting should be carried out not later than September, and in order to give it a further trial further experiments will be conducted in the Kokstad plantation during the coming season with the seed raised in this garden.

It occurs to me that a climate such as that of the Longkloof in the George and Humansdorp Divisions of the Cape Colony would be more suitable for this species of maize."

RUST FUNGUS.

Professor Marshall Ward's investigations into the relations between host and parasite in the case of the Bromus grasses and their rust fungus are bringing to light some interesting facts which have important bearings on the long-vexed questions of wheat-rust and the rust problem generally, which, as is well known, have passed into an acute stage now, principally owing to Eriksson's enunciation of the belief that the fungus can be transmitted in an invisible form, *via* the seed.

In addition to testing this mycoplasma hypothesis of Eriksson's (says *Nature*) the researches undertaken by Professor Marshall Ward are also directed to put to the proof the questions of degrees of specialised parasitism raised during the last decade by the researches of Plowright, Kleebahn, Eriksson, Magnus, Fischer, and others; and more especially to see if any deeper insight can be obtained into the causes of epidemics and the relative predisposition of immunity of certain plants to attack.

In a paper read to the Cambridge Philosophical Society on January 20th, 1902, Professor Ward gave a summary of his results with more than eighteen hundred infection experiments, made on twenty-two species and varieties of Bromus with the Uredospores of *Puccinia dispersa* (Erikss.), the brown rust of these grasses. These results show clearly that other conditions being the same the infection of a given species of Bromus, say *B. mollis*, by the Uredospores of the *Puccinia* depends on the origin of the spores, that is to say on the circumstances of nutrition and breeding generally to which they have been accustomed. For instance, if the spores have been reared on *B. mollis*, they infect another plant of *B. mollis* readily, but if they have been reared on *B. sterilis* they refuse to infect *B. mollis*, though they will readily infect another plant of *B. sterilis*.

But in addition to the infective capacity of the spores conditioned by their past history, there is the question of the predisposition or immunity of the host. For instance, it is easy to infect *Bromus mollis* with spores from *B. mollis*, but far less easy to infect *B. racemosus* with such spores, and practically impossible to successfully infect *B. sterilis*. Part of Professor Marshall Ward's work goes to prove that the immunity of given species of Bromus is not due to anatomical peculiarities, such as the number and size of the stomata, hairs, the volume of chlorophyll tissue and so forth, but to some substances and tissues in the living cells which escape microscopic investigation. In other words, the enquiry is being pushed into the domain of enzyme reactions, anti-toxins and so forth.

THE OVERSEA FRUIT TRADE.

Report on Cape Fruit Imported into London.

SEASON 1902.

(By MR. G. E. HUDSON, *Suffolk House, Laurence Pountney Hill, Cannon Street, E.C.*)

The following are the Imports of this year as compared with the four previous ones, viz. :—

1898	..	9,169 boxes.	1900	..	17,336 boxes.
1899	...	10,817 "	1901	...	11,263 "
		1902	...	14,998 boxes.	

PARTICULARS OF IMPORTS.

			1901.	1902.	
Grapes	...	...	6,280	5,896	boxes.
Plums	...	...	4,979	3,068	"
Peaches	...	...	4,127	2,512	"
Pears	...	...	924	746	"
Apricots	...	...	408	110	"
Nectarines	...	...	326	568	"
Apples	...	...	200	29	"
Quinces	...	...	8	25	"
Pines	...	...	11	23	"
Naartjes	..	...	—	1,999	"
Oranges	...	...	—	14	"
Lemons	...	...	—	12	"

Notwithstanding the above figures show a decrease in the number of packages received this Season as compared with those of 1901, yet I am pleased to be able to state that the quality and condition of the Fruit generally was an improvement on last Season's, Grapes perhaps excepted, and the pecuniary outcome of this Season has been a far better one for shippers generally than that of 1901.

I do not mean for one moment to imply that it has been entirely satisfactory, or as good as it might have been. It must be remembered the market on this side has been on the whole a bad one, the weather has been against us, and owing to the continuance of the war in South Africa, trade generally throughout this Country,

especially that part of it dealing principally in luxuries, of which the Fruit Trade so largely consists, has suffered considerably, people not caring to pay much for articles not of actual necessity - still I think and hope, on the whole, shippers have been fairly satisfied with the prices obtained for their Fruit when it has arrived in anything like good condition, and this has been the case generally with most of it, save, perhaps, Grapes, which are treated with more fully elsewhere.

One thing can be said, viz., that the general excellence of size and quality of the fruit on the whole, as received this year, shows a marked improvement on its predecessors, plainly showing that more care and attention is being given to the proper cultivation and selection of the best sorts of many of the Exports, and in consequence the British Public are not slow to recognise it; and writing, as I do now, after the conclusion of Peace, we have every reason to think that when we once more return to a normal state of things we may reasonably look for an improved market in South African Fruit.

APRICOTS.

The arrivals of these were only three in number, viz., 110 packages, but the size, colour and appearance were an immense improvement on the small, uncultivated Fruit we have formerly had, and we had some respectable prices for them. Not being a very favourite fruit here, I do not consider there will ever be a large demand for it, but there is a demand for a limited quantity of fine Fruit.

FREESTONE PEACHES.

My advices from Cape Colony prepared me for a short and not very excellent supply of this Fruit, owing to the semi-failure in the Colony, and this was fully borne out by the falling off of quantities received, viz., 1,600 boxes, as compared with last year's numbers, but what did reach here, though not as fine as could have been wished for, did very well in most instances, and I was pleased to see some new varieties coming over, such as Sea Eagle, Alexander, Foster, etc., and although some of these lacked appearance and flavour, still, a Peach, coming here in February and March, when the market is absolutely bare of anything of the kind, will pass, where it otherwise would not, hence these sold at fair prices. What is wanted is good shape, good colour, size and appearance, and, if possible, without that prominent tapering point, which gives them the appearance of being uncultivated, and detracts from their value.

Mr. H. O. Arton, of Meerlust Fruit Farm, sent a few, but too few, very fine, which were at once sold at a very paying price, and more were enquired for. These were "Foster" Peaches.

Some very fine Peaches were also sent over from Sir Jacob Barry's and Mr. Merriman's Farms, which commanded ready sale, and were much sought after.

CLINGSTONE PEACHES.

Very few came here, and those that did found no ready buyers, and were not worth sending over.

Semi-Clingstones we also had a few of; their appearance was very good, as this fruit generally is, but, except in the name, there was no difference, or very little, from absolute Clingstone. They sold at prices which, I should say, about paid their expenses. I fear they will never commend themselves to this market.

PLUMS.

Last year I had occasion to remark on the excellent size and appearance of this Fruit; this year I have to add that the size and appearance and general condition have far surpassed that of 1901; the Fruit showed more signs of careful cultivation and general selection than in previous years. Some few lots arrived here over ripe, but one drawback to the Plums this season has been a good deal arrived in an immature state, and although kept and stored for a time in a moderately warm store did not ripen or colour up at all, but rather withered and decayed; yet we had a good deal of very fine fruit, far superior to any we have had before, and also a few new varieties, viz., "Wickson," "Apple Plum," etc.

The Burbanks were unusually fine, yet did not command the attention of buyers to any extent, but their appearance and size sold them at not I imagine, very bad prices. I would like specially to mention Mr. H. Nicholson's shipment of "Kelsey Japans," their size, colour and quality left nothing to be desired.

Here again shipments in quantities seem to have fallen off some 2,000 boxes, but it must be stated with respect to this, that this year we had shipments of crates and punnets each containing as much as three ordinary boxes, so that the shortage is not so bad as it appears to have been.

Where all shippers sent such excellent fruit it would be invidious to name any particular one. I therefore content myself with saying all were good, and the Fruit generally speaking commanded a ready sale at moderately good prices.

NECTARINES.

The improvement in size, condition and general appearance of this Fruit this season as compared with 1901 was most marked. The arrivals, too, were in excess of last season, and this favourite Fruit found a ready sale at remunerative prices. Some few were a little too green, but as this Fruit seems to carry better than any other, I should imagine, it would not hurt it to pick it a little more mature than has generally been done.

PEARS.

The arrivals of these were nearly equal to last Season's, but the condition, appearance, size, &c., &c., were far better than in 1901. The Cape Orchard Company were the largest senders, and the whole

of their shipments without exception were the best and most creditable we have yet received from the Cape. The Fruit sold steadily and well, and we could have doubled the sale had the supply admitted of such. We had not one failure in the condition of arrivals this year.

QUINCES.

We had a few more boxes this Season, and most of it very fine Fruit indeed; that shipped by Mr. H. O. Aiton was so good that it created a small demand for itself from the few buyers who had first seen it. This Fruit is not very well known on this side at present, but as far as I am able to judge, it should do well in the future, but then it must be choice and best variety.

PINES.

The few that came here were of no account, and I doubt if they paid their freight.

APPLES.

As will be noticed, only 20 boxes of these came to hand this Season, and they were the finest I have yet seen from the Cape. They were shipped by the Cape Orchard Company, and compared most favourably with the best of any that we are now receiving from Tasmania. Their appearance and flavour left nothing to be desired, and could shipments such as these be continued, packed of course in the regulation box of 40 lbs. (I do not think it would be necessary to ship them in the Cool Chamber), I should say there would be a big future in this particular branch of the Trade, and I hope we shall see some more experimental shipments made next Season, but only of the very best variety.

Tasmanian Apples, of course, come here at the same time of year and sell very cheaply, and it is a question, at present, if the Cape Apples can compete with them; but this last Season, certainly, is the first time that I have seen a Cape Apple that stood a chance of holding its own in our market here.

GRAPES.

I come now, perhaps, to the most difficult class of the Cape Fruit Trade, and yet it is one in which there is the most demand, and is the most sought after.

The 1901 Grape Season was a failure, I can hardly say the 1902 Season is very much better. We did have a few medium lots, but not one very good. No two shipments came alike. The first arrivals were generally sound, but green and hard, no flavour, then when more mature, as in the later shipments, were wet, mildewy and wasty, the Hanepoots especially. If one shipment arrived in tolerably good condition and the Trade took to them, the next arrived in a very wet condition; the consequence was, we were never able to maintain a paying price if we had reached it the previous week. We did do better this year than last, but I cannot say that we did well, and

yet there is a big trade to be done in Grapes in this Country if we can only have them here in a good condition as we used to. One thing, I fear, is certain, that under the present system of Cold Chambers in use in the carrying ships, Grapes, in merely Cold Chambers without cold dry air passing through, will not be carried successfully.

The "Hanepoot" appears to be the worst carrying Grape of any; it is a great pity we are unable to get this Grape over here in sound condition, for it is the most sought after.

I think a great deal might be done in the growing of this Grape for shipment, especially in the thinning of the bunches. The smaller berries that are usually to be found in the middle of a bunch of these Grapes will not stand the pressure and packing, and being only half grown they break and spoil the whole bunch from the inside with their sticky juice.

The large well-formed berries on the outside usually arrive in perfectly sound condition, but sticky and looking uninviting, owing to the effects above mentioned.

Better attention to growing would, I feel sure, ensure this Grape carrying better.

The "Resin Blanc" and "Barbarossa" varieties stand the voyage fairly well, and in every instance arrive in better condition than the "Hanepoot."

NAARTJES (MANDARIN ORANGES).

I have kept this report back very late this season so as to be able to include the shipments of Naartjes, &c., which have been arriving up-to-date, in all some 1,999 boxes. Writing as I do now, in the middle of July, our market is over-stocked with English Strawberries, Cherries and various other fruits, and Cape Naartjes have naturally not done well; a few of the first arrivals did better, but coming at this time of year, in competition with our English Fruits, they were very dull of sale. Could we have these over in the early spring, no doubt there would be a good demand for them; but as far as any demand for Coronation purposes, there are none.

As far as their carrying qualities go they arrive on the whole in very good condition; the few that have not done so I do not attribute to the voyage, but possibly to not sufficient care being given in the selection of the Fruit.

ORANGES.

A few cases of these came to hand this year, "Navel," "Jaffa"; they were exceedingly fine, very taking-looking fruit and good flavour, but the quantity received was too small to form an estimate of what they might have done if received at another time of the year.

LEMONS.

Only twelve boxes of these were received, and I do not think there would ever be a trade done in them.

PACKAGES.

I am glad to see there is now becoming a more uniform desire to have boxes for each description of Fruit of the same size; this is distinctly a step in the right direction and aids much in the selling as buyers know what it is they are buying, instead of as formerly two or three different-sized boxes each containing a different quality and quantity of Fruit.

I think it would be just as well to here give the size of a few principal boxes that are now being used in the Cape Fruit trade for respective Fruits.

Grape Boxes	...24½ inches	by 18½ inches	outside by 5 in.	inside.
Half Grape Boxes	...18½	" 12½	" "	5 "
Peach Boxes	...18½	" 12½	" "	3 "
Plum Boxes	...16½	" 10½	" "	2½ "

The above appear to be the most useful sizes that we have used as yet.

We have had introduced this Season a crate containing four punnets, in all respects the same as is used in the Californian Fruit trade to this side, and as this is the first time we have had any experience of this particular package for Cape Fruit, it is perhaps rather early to say as to whether it will be a success or not. I am far from saying it may not be with some kinds of Fruit, but so far as I have seen it arrive here this season, it has not been very successful. It requires very careful packing indeed, and with Fruit at all ripe, I should not say that it would ever be successful.

I have seen a lot of crates this year packed loose and the Fruit bruising one another and seemingly not packed tight enough; even when the Fruit is green and immature it will still shrink a little, and, as I said before, requires very skilful packing.

One thing decidedly in its favour is that it provides for the largest quantity of Fruit in the minimum of space, and for freight purposes this is a very good feature. Only hard-skinned Fruits will, I fancy, stand this mode of packing.

SELECTION OF FRUIT.

At the risk of being thought tedious I beg to call the attention of Shippers again to the absolute necessity of the filling of the boxes with Fruit, in sorting and sizing it, and having it uniform.

We have to sell perhaps 100 boxes say at 10/-, when we might have 12/- or 15/- for two-thirds of them and 10/- for the rest, if it were not for the fact of finding in box after box, say of Peaches, two or three absolutely green, two say very little larger than a good-sized Walnut, and perhaps the rest (out of twenty-four) good-sized regular fruit. It is hardly necessary for me to point out that a buyer of say twenty or thirty boxes naturally discounts in his own mind, whilst buying, how much inferior fruit he will find in his purchase, and he buys accordingly.

I do not think I shall be far out in saying that besides this loss in the selling, the freight, boxes, packing, and charges on this worthless fruit entails a loss to the shipper that he might well be without.

In conclusion I may say that Cape Fruit has been brought before the Public very much this last Season, it has been sent to a great many of our Hospitals on this side where it has been very much appreciated, and has also been on show at the Imperial Institute, where Mr. Lewis Atkinson, whom I would especially like to thank in the matter, has extensively, and I might add, artistically exhibited it.

July 18th, 1902.

THE WORLD'S TOBACCO.

PRODUCERS AND CONSUMERS.

A marked feature in the history of the world's agriculture during the last two decades has been the increase not only in the area of land under tobacco cultivation, but in the actual number of countries which can fairly lay claim to the title of tobacco-producing States. Formerly Cuba, the Southern States of America, and the Philippines were responsible—at all events in name—for practically all the tobacco consumed in the British Isles, the Eastern products grouped under the name of Turkish having then no great vogue with us. Then India joined the list, Sumatra began producing her "wrappers," and Borneo, Burma, the Canaries, and other countries soon made their appearance in the price catalogues. Development has since taken place all along the line, and it would be interesting to compare the present output of Egyptian cigarettes—chiefly made of Greek tobacco, it may be remarked *en parenthèse*—with that of a score of years ago. The production of Mexican tobacco, according to a recently-issued Consular report, has lately increased to a very large extent owing to the starting of new plantations in the States of Vera Cruz, Oaxaca, and elsewhere, and the amount of leaf estimated for this year's gathering is not less than 17,000,000lb. Last year Mexico produced 377,000,000 packets of cigarettes and 120,000,000 cigars, and the manufacturers and planters claim that the quality has so greatly improved that it is almost, if not quite, equal to the best products of Cuba. Nor are our colonies unrepresented in the record of this expansion of a world-wide industry. Queensland, we learn from the official reports, is now both a producer and manufacturer of tobacco on a quite respectable scale. Her farmers cured nearly 500,000lb. of leaf last season, and her six tobacco factories manufactured 612,850lb. of tobacco, 28,857lb. of cigarettes, and 1,463lb. of cigars.—*The Field*.

REVELATIONS OF THE WOOL TRADE.

Substitutes Ruining the Wool Grower.

Probably the most fascinating subject at the present juncture for the student of economics is the serious decline of all the greater markets for the realisation of the products of the land. Practically all the larger markets have gone back on the seller during the last twenty years, and (remarks *The Field* in an interesting article on the subject) although the fall in others by reason of the greater magnitude and vitality of interests involved has created more stir, it is well within the mark to say that no article which the farmer has to sell has experienced so extraordinary a fall as wool. At the present time, and for many years back, wool brings, or has brought, the flock owner but a fraction of what it was worth a quarter of a century ago, and, astounding as the fall has been, the tendency seems to be towards a lower level. This remarkable state of affairs is the outcome of an indifferent and independent market. It has been commonly supposed that the buyers and users of wool acquired their commanding and invulnerable position in consequence of over supply in that article, although it was never very easy to understand how it could have got such an origin, seeing that all the time, while the market value of the article has kept falling, sheep farmers in all parts of the world have been studiously recasting their plans so as to make mutton instead of wool their staple product. They have not been altogether regardless of the quantity and quality of the wool produced by their flocks, but the interest in this commodity has diminished in proportion to its realising capabilities, and if it has not fallen quite to the status of a by-product in the estimation of the sheep farmer, the fleece has certainly been rendered more or less subservient to the carcass of the sheep. Farmers in their inborn innocence have been wont to attribute the decline of the wool market and the indifference of buyers as to the home supplies to the opening up of fresh sources of supply, and the vastly improved facilities for the transit of this, as of other agricultural produce. In short, the ruinous competition in the wool trade was believed to have a similar origin to that in grain and other products of the land. The improved means of transit allowed the produce of all countries to be brought into direct and narrowed rivalry, and the fortunate manufacturers were, in consequence, placed in a position to choose exactly what suited them, and practically at their own prices.

This was a very natural and convenient view of the situation to assume. A deeper inquiry into the workings of the business and to

the chief controlling influences, however, showed that our supply, in the sense in which sheep farmers understand it, could not be the only or the principal explanation of the depressed wool market. True, the means of intercommunication between the manufacturing centres and the various sources of supply have been incomparably accelerated and cheapened, but that, after all, is not of the vital importance in respect to wool that it would be in regard to more perishable commodities. Then there was the further suggestive fact that things were about as bad, if not worse, in other countries as they were in the United Kingdom, which would hardly have been the case if better marketing facilities alone were responsible. A searching scrutiny of the governing factors raised the suspicion that other powerful prejudicial influences were at work, and further pursuit on these lines led to a confirmation of the worst fears, and shed quite a new and startling light upon the situation. A fuller investigation and more accurate knowledge of the underlying facts have shown that the acute depression in the wool market is not the outcome of excessive supply at all, but is due to the wholesale substitution of cheap foreign articles in the manufacture of all descriptions of soft goods, reputedly made of wool. Of the extent to which the genuine wool of the sheep is superseded by all manner of cheap materials, mostly of a totally different origin, no one unacquainted with the business can have the remotest conception. If anyone wishes to obtain some idea of the scope and success of this gigantic and wonderful business, however, we would refer them to the paper which Mr. A. Mansell read at the international meeting of sheep breeders at Carlisle in the Royal Show week, and of which mention was briefly made in our columns at the time. The evidence set forth therein discloses a state of things which cannot be viewed by farmers with passive indifference. According to the mass of evidence accumulated by Mr. Mansell wool would appear to be one of the smallest ingredients, if, no doubt, the most vital, in the great bulk of the so-called woollen goods put upon the market. Indeed, if the position be correctly depicted, the wonder is that wool sells even at the present rates. At all events, after reading the paper referred to there will be no hesitation in endorsing the statement attributed to a wool expert that "if the wearing apparel as used by men and women were only made out of the pure wool fibre expressly given to us by Providence for this sole purpose, instead of being substituted by other foreign materials, then there would be a robust state of affairs in connection with wool." The same authority is responsible for the statement that in a drive of thirty miles round Bradford, not one, but scores of mills could be pointed out where for every bale of wool used, ten bales, and often more, are composed of shoddy, mungo, stockings and cotton, and that in what is known as the heavy woollen district of Yorkshire there are dozens of manufacturers who never buy a single bale of raw wool, and yet are known and acknowledged as influential manufacturers of "woollen" goods. The indictment is a strong one, but inasmuch as it has been widely

circulated and so far stands unchallenged, it is not unfairly held to be substantially justified. If the testimony of American writers is to be trusted, the condition of things is no better, but possibly worse, in that country. It has been estimated that in 1900 222 million pounds of wool, or roughly the yield of 42,990,000 sheep, equal to 72 per cent. of all the wool in the United States in that year, was displaced by shoddy.

This question of wool substitutes seems to be practically analogous to that relating to margarine, which rightly aroused so much discussion some few years ago. Legislation was resorted to to prevent the sale of the cheaper preparation in the name of or in substitution for the genuine product of the cow, and although the terms of the Act are not so strong and rigid as farmers could have desired, there is reason to believe that benefit has resulted. Sheep owners have a right to expect and to insist upon similar means of relief and safeguard. They have no just claim to hinder the use of shoddy and other foreign material in the manufacture of textile goods, but they, as well as the general public, have a perfect right to demand that articles made of such material shall be sold under their correct designation. This question has been raised at a most opportune moment, for, with Mr. Hanbury at its head, the agricultural element has never before been so strongly represented in the voice of the nation, and consequently at no previous time have agricultural matters stood a better chance of receiving proper and due attention in Parliament.

Help to Cheese Makers.

In an article on the New Agriculture in the June *Scribner's Magazine*, W. S. Hardwood says:—"A hitherto unknown element in milk, a new ferment, has been discovered at one of the experiment stations, called galactose, which is proving of value in the ripening of cheese. The properties of this ferment are similar to the secretion of the pancreatic organ in the human body. Old cheese is a pre-digested food, and the digestion is wrought by the galactose. It was found that the galactose would go on working at very low temperatures, temperatures at which bacteria were practically inert. Cheese was put into refrigerators and kept frozen for months. Other cheese was kept just above the freezing-point. It was found that the finest cheese is cured at from 40 degrees to 45 degrees Fahrenheit. Practical cheese manufacturers had maintained that 50 degrees was the lowest temperature at which cheese could be worked without becoming bitter and worthless. The new discovery will, it is believed, revolutionize cheese manufacture, doing away with all curing-rooms, the cheese being sent directly to the refrigerator."

THE MISUSE OF COAL

AND

THE USES OF FORESTS.

PROF. JOHN PERRY AND MR. D. E. HUTCHINS.

The following interesting communication from Prof. John Perry appeared in *Nature* of the 20th March:—

THE MISUSE OF COAL.

As England has taught the world how to use coal, she ought to think of teaching the world how to use coal without waste. Coal is so plentiful, so cheap; it is so much to the interest of many people that the waste should go on, and the general public, who alone can apply a remedy, are so ignorant of natural science, that when, every few years, I draw attention to this subject, I feel my efforts to be hopeless. Nevertheless, you will perhaps allow me to call attention to the fact that in the very best and largest steam engines less than 10 per cent. of the energy of coal is utilised; in many small engines only 1 per cent. The remaining energy is quite wasted.

In the electric generating station of a city like Manchester, there are engines of 12,000 horse-power, driving tram-cars and house-lights. In a line-of-battle-ship there is more than twice this power. Two new Cunard steamers are, I understand, about to be ordered, each of which will have 48,000 horse-power. The great waste of energy inevitable in all heat engines of the world is therefore enormous.

It is known that when fuel energy is converted into the electric form directly, as in a voltaic cell, more than 90 per cent. of the fuel energy is convertible into the mechanical form, but at present contrivances to do this even in the case of gaseous fuel are too bulky and expensive to compete with heat engines. I wish once more to suggest that an organised attempt be made to convert the energy of coal into electric energy in some form of engine which shall not cost more or have greater weight than a steam engine of the same power.

For the heating of buildings, Lord Kelvin pointed out long ago that the very law of thermodynamics which makes a heat-power engine inefficient makes it possible to obtain from one unit of energy the effect of 50 or 100 units by direct heating. I know of nothing which so well illustrates the scriptural promise of the seventy and seven fold reward of virtue as this. Discover the energy engine and you multiply your power to heat buildings from coal, seventy and seven times. But how can we make facts of this kind obvious to ordinary men—the men who are said to be educated when they know absolutely nothing of physical science? Even with coal as cheap as

it is we might appeal to its selfish users by pointing out that with the new kind of engine a ship would be able to travel ten times as far at full speed as she now can do without coaling.

The world's yearly output of coal recently was 663 million tons. Of this Britain's share was 30½ per cent. If the whole of the energy of Britain's coal for one year could be utilised and charged for at 8d. per Board of Trade unit, the price paid in many towns by consumers of electric energy, it would amount to 100 times our national debt. It is to be remembered that the cost of human labour when used most economically is nine times the figure here given.

Here is another fact. Scientific men know of no other store of energy available for man's use than fuel from the earth, except what we may get by the help of the tides or by wind or waterfalls. To depend upon the future discovery of some great store is to act like a spendthrift who knows of no relation whose death will give him more money and yet who goes on wasting his substance. The energy of coal is the foundation of such widespread comfort as we now observe all over the world. To put the matter in a very definite form we may say:—The cost of one Board of Trade unit of energy by the agency of human labour working most economically is seventy pence; the cost of the unit as given out by a large steam-engine in a cotton factory is one farthing; the cost per unit of the coal alone (at 8s. per ton) if all its energy were utilised is one one-hundredth of a penny. But when our coal supply is exhausted, when all the races of the world have fought for the waterfalls and places of high tide, the price must go back to the higher figure. The failure of our coal supply is one of the two things neglected by Mr. Wells in his "Anticipations," the recollection of which would have modified all his conclusions. When coal becomes scarce, people will wonder how it was possible for the nations to spend so much money as they all now do, and our grasshopper weight of a national debt will seem to be an unbelievable burden. Seventy pence to a farthing is the ratio of values without and with coal even now, and the ratio ought to be ten times as great, or 2,800 to 1.

In sixty years we have greatly destroyed that store of energy which is the foundation of what some of us call civilisation. In another hundred years the English hamlets of contented working folks that have become cities of luxurious people will decay again into hamlets, inhabited by a discontented, poverty-stricken population which will curse its ancestors for their prodigality. They will not curse us for using coal perhaps, but they will know how to economise coal, and so they will curse us for our ignorance. Over and over again have I called attention to the fact that we are wasting 900 times the amount of our national debt every year. I have dragged this matter into my lectures and papers with and without relevancy many times, and every one of my hearers and readers neglects its significance. Scientific men know it, but they think it useless to try to impress the ordinary citizen, so ignorant of natural science as he is and so unheeding of any kind of danger which was unknown to

his forefathers. What annoys me particularly is not so much the selling of my birthright as that I should sell it for such a mere mess of pottage.

To return to my cry for a new invention. Many men have advanced the subject beyond its first principles; they know of directions in which to work with prospects of success. In the animal machine the thing is actually done; but of this machine the mere conversion of fuel energy into mechanical work is not the most important function, and the machine is very complex. Still, in it we have no heat engine, but the sort of thing we are looking for. I do not wish to set capitalists and patent lawyers against me, and so I will not give my reasons for saying that there is no sufficient temptation for any scientific man to take up the quest. Unless it is taken up as a matter generally recognised to be of national or world-wide importance, there is no more use in tackling the problem than in hunting De Wet with a small army. Many scientific men must combine their efforts in an organised way, freely communicating their ideas to one another and consulting each other as to their experiments. They must be made free from pecuniary cares and assured of great rewards in case of success. I feel sure that if one or two chiefs like Lord Kelvin or Lord Rayleigh were entrusted with the expenditure of a million a year for two or three years by the English nation for the benefit of the world, with power to impress the services of all scientific workers likely to be of use, to make their operations as extended as they pleased, they would bring the invention within reach of the ordinary engineer.

JOHN PERRY.

Forests as Fuel Providers.

The Vast Possibilities of Arboriculture.

(REPLY BY MR. D. E. HUTCHINS, Conservator of Forests, Western Districts of Cape Colony.)

MISUSE OF COAL.

Nature of March 20, containing a most interesting communication by Prof. John Perry on the "Misuse of Coal," has reached me lately. Surely Prof. Perry takes an insular view of the matter. Like so many Englishmen, alas! he knows not the forest! The greater portion of the world cooks its food and makes itself comfortable on wood fuel, and though all the forests in the world would, according to European ideas, be inadequate to supply by their growth the present expenditure of coal (their fossilised remains), to overlook altogether

the sun power which we can fix by growing wood fuel is surely, from even a European point of view, an oversight. Helmholtz compared the number of thermal units received by an acre of land in Germany during a year with the number of thermal units produced by burning the vegetable matter elaborated during a year. His calculation was that only the $1/1477$ th part of the sun's heat was thus rendered available.

On this basis it is possible roughly to calculate the maximum thermal efficiency as firewood of the wattle or eucalyptus vegetation on the coast of Australia or South Africa. (Insolation is for the latitude somewhere about one-sixth greater at Cape Town than in mid-Germany; practically it is more on account of the clearer atmosphere.) The production of firewood is about five times as much; thus, taking Crottendorf as an example of a European forest giving one of the largest yields in timber, we have:—

Crottendorf spruce, mean yearly yield 143 cubic feet.

Quick-growing Eucalypts, S. Africa, do. 700 " "

Or the maximum South African yield is five times the maximum European yield. But since the average weight of eucalypt wood is three times that of spruce, the heating power produced on an acre of eucalypts must be set at about fifteen times that produced on an acre of northern and mid-European forest. Thus on the basis of Helmholtz's calculation a eucalypt plantation can, with the most favourable circumstances, in South Africa or on tropical mountains, store up, say, $15/1500=1$ per cent. of the solar energy received on the unit of area.

The position in Cape Town to-day is that it is cheaper to plough the ground and plant a forest of quick-growing trees than to import coal from over the sea or by a long and expensive land journey. Firewood in Cape Town is worth nearly 1s. per cubic foot, and before the railway was extended to the Diamond Fields firewood there has fetched 1d. per lb., the price at which sugar has been retailed in England. No doubt from a British insular point of view coal at £2 or £3 per ton is a terrible misfortune. It certainly increases the cost of running machinery; but if this does not take place to a prohibitive extent, and if it makes the user of power careful not to waste it, it is not an unmixed evil. And if thereby afforesting is made a paying operation, it is at least open to discussion whether dear coal and good forests would not be better for England than an expenditure of £23,000,000 sterling on imported timber, and the evils, including physical degeneration of the race, and coal fogs in the big cities, which have been shown elsewhere to result from England's neglect of its forests. The reference to De Wet in Prof. Perry's communication is unfortunate; a small quick-moving army would probably have caught him. And surely cheap coal and luxury is not the *summum bonum*. Rather let us have hamlets of strong forest workers than the luxurious town dwellers of to-day with their decayed muscle and cheap mechanical power! Compare a European engine-driver with the runner castes of India and Japan. The

engine-driver shows us perhaps fine inherited muscle, but going to decay for want of use; the Eastern runners show the development of muscle by both use and inheritance. Which would have the best chance of catching De Wet a hundred years hence?

As far back as 1882 the discovery was made by Sir D. Brandis and myself that eucalypts planted on tropical mountains will produce wood fuel at the rate of 20 tons (dry weight at 60 lbs. per cubic foot) per acre per year in perpetuity. The eucalypt plantation reproduces itself when cut, without further expense, and its dry timber, heavier than coal (which, as met with commercially, weighs 50 lbs. to 52 lbs. the cubic foot), has an equal or a higher thermal power, bulk for bulk, than coal. We obtained this result as the maximum yield of *Eucalyptus globulus* on the Nilgiris, Southern India. No doubt there are other instances where higher yields are produced now, and no doubt also when the coal supply is exhausted, selection and experiment will produce a forest vegetation that will produce more than 20 tons per acre per year. The sugar beet and all the fruits and vegetables of civilisation show how the vegetable kingdom can be moulded to suit man's wants. If a chance tree on a chance mountain in a chance soil can produce the equivalent of 20 tons of coal per acre per year, it seems not unreasonable to suppose that by selection we can produce, say, double this, or 40 tons. To produce this in perpetuity we should probably have to find a tree with the moderate soil requirements of the Conifers. A powerful sun, a heavy rainfall, and a very rapid forced growth would be the essentials of such a production of wood fuel.

Looking at a rainfall map of the world, one sees that these conditions are fulfilled over about 8,000 million acres of its surface (which is between one-fourth and one-fifth of the total land surface of 35,200 million acres). I take latitudes below 40° and rainfalls above 40 inches. One-half of this area under forest might thus yield the equivalent of 161,000 million tons of coal yearly. This is more than 288 times the world's present consumption of coal, assuming that coal and eucalypt timber are of approximately equal heating power. On the basis of the actual forest yields of to-day we have half this, or 80,500 million tons. In Germany, one-fourth of the total area is under forest, and this is held on the highest authority to be the suitable proportion for a thickly-peopled civilised country such as Germany. The forest should properly occupy a higher proportion in countries where large areas are pestilential and unsuited for human habitation. Putting this, however, aside, and taking the German standard of one-fourth forest, then on the basis of to-day's maximum yields we should obtain a yearly output of 40,250 million tons. And if to convert the maximum forest yield to an average forest yield we again divide by two, we obtain 20,125 million tons. Lower than this I do not think we can reasonably go for the class of forest under consideration. *It is a little more than thirty times the world's present consumption of coal.* The world's yearly output of coal recently was 663 million tons, says Prof. Perry.

Thus we see that the yield of firewood from the world's tropical and extra-tropical forests, whenever they are fully stocked and scientifically worked, will yield the equivalent of from thirty times to 122 times the present consumption of coal, or even up to 243 times the present consumption of coal if we succeed by cultivation in doubling present timber yield figures.

It may be objected that my figures are far in excess of those representing the yield of European forests and that they require confirmation. No doubt they are far in excess of European figures; but so also is the intensity of the vegetative process in these latitudes, and so also is the stature of the Sequoias of California and the Eucalypts of Australia and South Africa above the stature of the biggest spruces and silver-firs of Europe. The Nilgiri figures I have quoted above were formally recorded in two official reports, printed and published by the Madras Government in 1882.* They have since been confirmed by the measurement of forest officers who have subsequently had charge of the Nilgiri plantations. Similar figures have been obtained by myself and other forest officers in South Africa. They have been exceeded in several plantations in Natal, while at Johannesburg they have not been confined to Eucalypts, but have been obtained from *Acacia decurrens*, or black wattle, as well as from some other trees.

Therefore, "when our coal supply is exhausted, when all the races of the world have fought for the waterfalls and places of high tide," there will still remain that which Englishmen of all the civilised races of the world do most neglect—the forest.

D. E. HUTCHINS.

Grootvadersbosch, Swellendam, Cape Colony, May 14.

* "Suggestions regarding Forest Administration in the Madras Presidency," by D. Brandis, C.I.E., Inspector-General to the Government of India (Madras, 1882).
 "Report on Measurements of the Growth of Australian Trees on the Nilgiris," by D. E. Hutchins, Dep. Comr. Forests, Mysore (Government Press, Madras, 1883).

The necessity of salt for sheep has been demonstrated by experiments in France, where three lots of animals were fed alike except that one bunch had no salt, one lot half an ounce every day, and the other $\frac{2}{3}$ of an ounce daily. Those that had half an ounce gained 4.5 pounds each more than those which had no salt, and 1.25 pounds more than those which had more than a half ounce. So it seems that too much salt can be given as well as too little. The salted sheep had 1.75 pounds more of wool and a better fleece than those that had no salt, showing better results in the wool; that is, larger profit than in the flesh.

BITTER SEVILLE ORANGE STOCKS.

Convincing testimony that the Washington Navel and other varieties of sweet orange do most satisfactorily when budded on the Florida Sour orange is found in the subjoined communication from Mr. J. W. Mills, the Superintendent of the University of California substation, located at Pomona in the heart of the orange growing section of Southern California. The Florida Sour is considered by the Washington authorities to be a strain of the Bitter Seville variety of orange, and whether it is the true Bitter Seville or not it is highly resistant to the *mal di gomma* disease.

The mass of evidence which the Department of Agriculture has gradually accumulated by correspondence with reliable horticultural authorities in Europe, America and Australia has made clear at least one fact, namely,—that the term “Bitter Seville” is used to cover various strains or subvarieties of bitter oranges, and that these lack uniformity in their behaviour towards different kinds of sweet oranges when used as their stocks. Arrangements are now being made by the Department for an elaborate test of the suitability of the Florida Sour and the European Bitter Seville alongside of strains of the Cape Bitter Seville for the principal varieties of the sweet orange recommended for planting at the Cape.

The variety known to Mr. Mills as Bitter Seville seems from his description not to be that variety at all. His letter reads:

“If our collection of fruits is correctly labelled I think that your difficulty lies in the variety of *Citrus bigaradia*. Our Bitter Seville is very different from the Florida Sour, but I am unable to say if what we have is different from the Bitter Seville of Europe. Our stock came from Florida. The Bitter Seville is not used in this State as stock upon which to bud, but the Florida Sour is used to some extent, there being some groves of forty to fifty acres of Washington Navel trees budded upon the Florida Sour, while small plantations of one to ten acres are quite common. The Washington Navel and other varieties do not seem to make as rapid growth on this stock when young as they do on sweet stock, but when the trees get older, eight to ten years, the trees seem to be very prolific and extremely vigorous. The individual specimens vary sometimes. The Sour stocks which develop numerous laterals force a much more rapid growth than those which do not, yet one of the thriftiest and most even grown Washington orange groves in Southern California, containing fifty or sixty acres, is budded on Florida Sour stock. The first few years when it was expected that it would produce heavy crops, the returns were not so heavy as those from near-by groves on sweet orange roots, but after the grove was about ten years old it produced good crops of high grade oranges. We have one Washington Navel tree in our grove which was planted in the place

where the original died the first year after planting. The original trees were on sweet stock, and the one tree which was planted between, the following year, is now as large as the adjoining trees. The trees were planted in 1891. The one Sour stock planted in 1892 the first few years it was considerably smaller but gradually gained on them. The root system of this tree is pictured on page 17 and designated as "Sour Stock No. 2" in California Bulletin No. 138, which I send under separate cover.

"As for lemons budded on Florida Sour, I cannot give reliable information. We had a few varieties on that root, but they were in a very bad condition when I came here, were frozen to the ground. They have never made a good growth since, but have been healthy and enormously productive, that is, the trees grown from sprouts from the old trunks. It is known that the lemon does well on Pomelo root, which is almost as resistant to the *mal di gomma* as the Florida Sour. The "rough lemon" is highly recommended by authorities as a hardy stock, and in such situations as you evidently have, would be desirable for lemon stock.

"Our Bitter Seville as we grow it, has no wings on the petiole or primary leaf. The fruit resembles the frustrum of a cone with a rounded base, and grows on the ends of the projecting branches in clusters which often break the branches off. The Sour (Florida) has ample wings on the petiole, the fruit is round and rough (the Bitter Seville is moderately smooth), and is borne on the branches just as the ordinary orange is.

Should you so desire, we would gladly mail you a few young seedlings of the Florida Sour orange stock, seedlings grown from our own trees. I will add that Dancy Tangerine is now superior in growth when grown on sour stock alongside of those on sweet orange. Ruby Blood, Pine Apple and Valencia all make a satisfactory growth on Florida Sour."

SOME FACTS ABOUT TRELLISING VINES.

(By MR. C. MAYER, Agricultural Assistant, Stellenbosch.)

In the *Agricultural Journal* No. 9 of last March I referred to the extraordinary yield of grafted vines in a local vineyard, where the vines had been trellised and pruned on the principle of leaving two long bearers of about eight eyes each, fastening same in a horizontal position to the lower wire of the trellis, and two short ones of two eyes required to produce the necessary pruning wood for the next season.

Since then I have been able to get fuller particulars, which I attach hereunder in tabulated form as I consider them of value,

seeing that they represent local experience. Comparing the records of productiveness of trellised and untrellised vines or the productiveness of the former with the average return in the ordinary course of vine-culture under similar conditions, the possibility of materially increasing the yield from a given area under vines, by merely adopting a different system of training, is clearly demonstrated. The economy of the trellis, on at least the smaller holding, appears to me also proven, as, against an initial outlay of about £20 per acre for the erection of the trellis, there is the continuous increase in the quantity of wine, paying practically for the cost of the trellis within 5 years and representing after that a clear gain.

To return to the production as given in the schedule, the yields were obtained in a vineyard having prior to the invasion of phylloxera produced not more than an average crop. The soil is low-lying of a somewhat clayey nature, varying however considerably and shows at an average about .058 lime, .050 potash and .015 per cent. phosphoric acid, so that it can only be described as moderately fertile. The vines have been trellised for three years and were last manured in 1901 as per records. Though the returns indicate a beneficial influence of muriate of potash far above the use of other artificial manures, further observations are required to arrive at mature conclusions as to the application of such fertilisers in the vineyard.

The vines in question have been trellised for three years, and though they produced ever since an increased crop, no particular ill effect on the vegetative powers of the vines could be observed, except that in two instances vines suffered a little from drought towards the end of summer and dropped their leaves prematurely.

With regard to the maturity of grapes from trellised vines, green grape and stein ripened about three weeks later, being otherwise of the same quality as grapes from ordinary trained vines. In the case of hermitage trellising had a much more marked influence, inasmuch as the grapes and berries were smaller and did not produce more than between 14 to 15 per cent. of sugar according to the indications of the saccharometer. In spite of this rather low amount of saccharine matter, the wine made from such grapes is very creditable and of a satisfactory quality. Its odour is good, the small amount of volatile acid remarkable, and it developed so satisfactorily, without any other treatment than periodical tapping, that within three months of its production it was perfectly clear and stood bottling without turning turbid.

A recent analysis of this wine yielded the following results:—

Alcohol by volume per cent	...	...	10.21	per cent.
Total acid	...	...	0.5554	
Extract	...	...	2.578	
Volatile acid	...	...	.0432	

Which go to prove that the wine is sound and of good quality as far as quality can be shown by chemical analysis.

Variety of Vine	TRELLISED VINES						ORDINARY TRAILING VINES											
	Age	Distances	Number to acre	Number of vines tested	Manured in 1901 per vine	Yield in lbs	Average per Vine	Lb equal to yield per acre	Age	Distances	Number to acre	Number of vines tested	Manured in 1901	Yield in lb	Average per Vine	Lb equal to yield per acre	Liquid to 1 acre	
Stem on Riparia	4	6 x 4	1812	772	B S. 2 ounces	11940	14½	26727	12 1									
Green Grape "	4	"	"	650	Do. "	7075	10½	18373	5 4	6	4 x 4	2722	800	B S.	4000	5	13610	6 1
Hermitage "	5	"	"	465	Do "	6705	14½	26274	11 9									
Do. "	"	"	"	160	Do and St M.	2812	do	do	do									
Do "	"	4 x 4	2722	273	St M	3195	11½	51988	14 5	3	6 x 4	1812	1200	Do	4050	3½	6140	2 8
Do. "	"	"	"	312	Do. ½ oz N S	3150	10	27240	12 3									
Do "	"	"	"	312	Do. 1½ " Sup. p	3195	10½	27900	12 6									
Do. "	"	"	"	312	Do 1 " M Pot	3847	12½	33244	15.1									

Abbreviations used

B S Basic Slag
 St M Stable Manure
 N S Nitrate of Soda
 Super Superphosphate
 M Pot Muriate of Potash

DISTRIBUTION OF AMERICAN VINE CUTTINGS, 1902.

The Agricultural Assistant at Stellenbosch (Mr. C. Mayer) reports that the distribution of American vine cuttings has been completed for 1902 and encloses the accompanying returns showing :

- (1) the total number of cuttings applied for ;
- (2) the actual number of cuttings supplied ;
- (3) the number short to meet applications in full.

Comparing the returns No. 1 and No. 2, he remarks there is every evidence of the demand for American vine cuttings not having diminished. In fact, an increasing demand may be looked forward to, as a portion of the viticultural area is still free of the pest of phylloxera and other portions have only recently become infected.

Viewing this year's distribution from a point of the most favoured variety, *Rupestris Metallica* takes the lead. Next follows *Aramon-Rupestris* and last comes *Riparia*, leaving *Jacquez* out as a variety to be used for specific purposes only. This preference for *Metallica* and *Aramon-Rupestris* has been noticeable everywhere, and not only interfered with the sale at Tokai but also the sales of grafted vines from private sources.

As an explanation of this change in the attitude of the farmer towards American vines, he points out that the *Rupestris* varieties have all round shown the greater adaptation to Colonial conditions and admit of a wider selection of soils, particularly hillsides, now oftener used for vine culture than heretofore.

Comparing the output of Class I cuttings last year and this season, there is a substantial increase of over 200,000 cuttings in favour of 1902. This increase is the more surprising as one block had suffered under the attacks of calandra and on two others the old vines had been removed to make room for *Jacquez*.

Taking these facts into consideration, the only explanation possible is the beneficial influence of manure, the plantation having received a dressing of 400 lbs. basic slag to the acre and 200 lbs. muriate of potash in 1900, followed up by a light dressing with Cape guano in 1901.

SCHEDULE OF YIELD, APPLICATION FOR AND DISTRIBUTION OF AMERICAN VINE
CUTTINGS, 1902.

ALL EIGHT DIVISIONS.

Variety of American Vines.	No of Applicants	Applied for		Were supplied with		Short	
		I.	II.	I.	II.	I.	II.
Riparia g.m. ..	35	446,500	27,750	401,000	43,900	45,500	..
Rupestris l f. ..	18	209,500	1,000	87,300	1,000	122,200	..
Do. Metallica ..	131	1,732,000	301,500	435,490	70,800	1,296,510	262,000
Aramon-Rupestris ..	74	997,000	55,250	350,000	25,750	644,000	32,500
Jacquez ..	54	442,350	77,800	36,850	13,500	404,500	64,800
Totals ..	312	3,824,350	462,800	1,310,240	154,950	2,512,710	359,300

District.	No. of Applicants.	RIPARIA G M.					
		Number applied for.		Number supplied.		Difference between demand and supply.	
		I.	II.	I.	II.	I.	II.
Stellenbosch	7	115,000	..	127,000	..	18,000	..
Paarl ..	11	172,000	25,000	172,000	25,000	..	..
Wellington	3	27,000	..	27,000	..	..	..
Tulbagh ..	2	20,000	..	14,000	3,150	6,000	..
Worcester ..	11	78,000	..	51,500	13,000	21,500	..
Caledon ..	1	9,500	2,750	9,500	2,750	..	..
Cape and Malmesbury	..	..	..	..	..	..	..
Totals ..	35	446,500	27,750	401,000	43,900	45,500	..

District.	No. of Applicants.	RUPESTRIS L. F.					
		Number applied for.		Number supplied.		Difference between demand and supply.	
		I.	II.	I.	II.	I.	II.
Stellenbosch ..	2	20,000	..	20,000	..	..	..
Paarl ..	12	164,000	..	58,800	..	105,200	..
Wellington ..	..	..	..	..	..	..	..
Tulbagh ..	2	20,000	..	3,000	..	17,000	..
Worcester ..	1	3,000	..	3,000	..	..	..
Caledon ..	1	2,500	1,000	2,500	1,000	..	..
Malmesbury ..	..	..	..	..	..	..	..
Cape ..	..	..	..	..	..	..	..
Totals ..	18	209,500	1,000	87,300	1,000	122,200	..

District.	No. of Applicants.	JACQUEZ.					
		Number applied for.		Number supplied.		Difference between demand and supply.	
		I.	II.	I.	II.	I.	II.
Stellenbosch ..	7	47,000	10,000	16,000	4,700	31,000	5,300
Paarl ..	25	316,500	68,000	13,900	5,300	302,600	57,700
Wellington ..	1	..	1,000	..	1,000	..	..
Tulbagh ..	1	1,400	..	1,400	..	..	..
Worcester ..	18	76,200	3,800	4,300	2,500	71,900	8,000
Caledon ..	1	1,000	..	1,000	..	..	..
Malmesbury ..	1	250	..	250	..	..	..
Cape ..	..	..	..	..	..	..	..
Totals ..	54	442,850	77,300	36,850	13,500	404,500	64,800

District.	No. of Applicants.	RUPESTRIS-METALLICA.					
		Number applied for.		Number supplied.		Difference between demand and supply.	
		I.	II.	I.	II.	I.	II.
Stellenbosch ..	22	297,000	..	149,200	30,000	117,800	..
Paarl ..	72	949,000	288,500	*118,890	33,500	830,110	255,000
Wellington ..	10	124,000	..	†38,000	..	86,000	..
Tulbagh ..	8	77,500	..	‡24,400	1,300	53,100	..
Worcester ..	18	281,500	12,000	102,000	5,000	179,500	7,000
Caledon ..	1	3,000	1,000	3,000	1,000	..	..
Malmesbury ..	..	..	..	..	..	..	..
Cape ..	..	..	..	..	..	..	..
Totals ..	131	1,732,000	301,500	435,490	70,800	1,296,510	262,000

Includes 40,115 I. from Constantia.
 do. 29,000 do. do.
 do. 20,000 do. do.

District.	No. of Applicants.	ARAMON-RUPESTRIS					
		Number applied for.		Number supplied.		Difference between demand and supply.	
		I.	II.	I.	II.	I.	II.
Stellenbosch ..	15	140,500	22,000	140,500	9,000	..	13,000
Paarl ..	81	582,500	32,500	124,500	13,000	458,000	19,500
Wellington ..	7	136,000	..	45,000	..	91,000	..
Tulbagh ..	8	77,500	..	8,000	1,000	69,500	..
Worcester ..	10	51,500	..	26,000	2,000	25,500	..
Caledon ..	2	5,000	750	5,000	750	..	..
Malmesbury ..	..	..	..	..	..	..	..
Cape ..	1	1,000	* ..	1,000	..	..	..
Totals ..	74	994,000	55,250	350,000	25,750	644,000	32,500

AN AMERICAN VIEW OF CAPE MOHAIR.

Mr. Hoerle again.

Writing to the *Oregon Agriculturist*, Mr. G. A. Hoerle, the gentleman who recently visited the Cape in the interests of American Angora breeders, has another tilt at Cape mohair. He says:—
I am now more convinced than ever that a really good quality of mohair cannot be raised in Cape Colony. The scarcity of rain water for irrigation and drink, the brackish artesian water and soil, as well as the continued dry, sharp and dusty winds, take the life and lustre out of the mohair unless it contains an excess of oil, which is usually the case when the hair of the animals is too coarse. At the auction sales at Port Elizabeth I found that only the poorer classes of mohair had the really perfect curls, and these were confined almost solely to the fleeces of goats in the mountain grass-veld. Curly mohair also bore evidence of having come from animals of short breeding and from annual shedders, whereas the best styles of mohair appeared from a distance as if they had been worked into a complicated twist, and the heavier and thicker these twists, the better a class of mohair it looked like. The grass mountain veld produces a better quality of mohair with more life and lustre, but of lighter fleeces. None of the mohair had sufficient quality to be really equal to very best Turkish, except that of the best kids of from seven to nine months' growth, which seems to me one of the many proofs that it is the climate and not the animals which is at fault.

"QUALITY" AND "STYLE" DEFINED.

I think a distinct difference should be made in the terms "quality," "class" and "style." I use the word "quality" here when I speak of the value of the mohair from a spinner's standpoint, which is often good enough to be "first-class" from rather a short-bred stock; "class" (perhaps "grade" would be better) refers to the breeder's standpoint: "style" I apply to the technical appearance of the hair, viz.: either curls, waves or twists, straight, flaky, fluffy, tucked up, etc. The waves may be even or uneven, long or short (very similar, as they are, to the wool of some of the English breeds of sheep). Even the hair of twisted appearance should, upon close examination, be found to be merely in regular waves, and, as far as I could judge during my short stay in South Africa, I believe that the higher the animals will be bred the shorter will become the regular waves and

the nearer they will finally look like the short, regular kink of merino wool. Poor condition will change all styles of mohair.

An Angora goat judge in South Africa, after having taken in the general shape and appearance of the body and fleece of an Angora, usually parts the strands of mohair along the back of the animal, and if these are not in length and style equal to those growing two or three inches down on the body, the goat is condemned at the very start.

PREVALENCE OF KEMP.

In the very best flocks I found some animals entirely without kemp, but these were usually rather small in figure and light in weight. I found quite a number with very little kemp, and that so short that the manufacturers would not call it kemp at all but "short undergrowth," yet kemp it is in reality, though a breeder need not object to it except on the score of a fancy point. I have no doubt that before long entire flocks will be found in South Africa in which the so-called "short undergrowth" animals will be as scarce as are to-day those with recognized kemp.

As a whole, the South African Angora flocks have an uncommonly large amount of kemp and of very coarse mohair. This superabundance of kemp surprises me not, as, contrary to Mr. Schreiner's opinion, I found the Boer goat an uncommonly long-haired animal; one of them I measured in the presence of Mr. J. J. Cawood having hair from 11 to 12½ inches in length.

Good, long breeches (the lower part of the thighs) are what is now most highly esteemed, and I have seen quite a number of animals which had down to a point one-third the distance above the hocks up to the hip-bones, longer mohair than on any other part of their bodies.

I was told by some of the best judges there that of the goats imported from Turkey to the Cape a few years ago, "Rhodes," belonging to Mr. Edwards, is the only buck which equalled in general appearance the very best Cape Colony raised bucks, but he is surpassed by many of them in mohair and quality of their get, and also that there was not one of the imported bucks which caused a real improvement in his get on the best Cape does.

All told, there can be no doubt that the Cape, though far from perfection, is the country for us to fall back on, and not only for a buck or two or a few pairs now and then, but for large numbers of both males and females. I had made preparations to buy from 125 to 150 bucks and from 250 to 300 does, could I have brought them over *via* New Orleans at a shipping rate of \$20 per head. Shipments *via* New York at trust prices forbid my engaging in the Angora business on a large scale. Much as I would like to be further identified with the Angora industry I cannot afford to keep waiting for our Bureau of Animal Industry to remove a superfluous obstacle to importation. Not a single instance is known in South Africa when goat diseases were transmitted to cattle or cattle diseases to

goats. Moreover, Dr. Hutcheon assured Dr. Salmon that he would cause all possible precautions to be taken.

Immediate efforts will now be made to bring the Transvaal and Orange River Colony into line with the Cape on the export-bounty proposition, and that will close to us the best opportunity of improving our Angoras.

G. A. HOERLE.

THE OLD WAYS AND THE NEW.

The Patent Medicine Man.

Cure-alls and the Credulous.

(By LEWIS MOSS, in the *Oregon Agriculturist*.)

"My mother always fed her baby chicks on corn meal" or "Grandma never went to half as much trouble with her little chicks" are samples of what we can hear any day by doing a little visiting among our country friends who have not yet become accustomed to all the "new fangled feeds and appliances" for the successful rearing of young chicks.

But it is not the feeding of chickens of which I wish to write this time. There is another subject, the doctoring of chickens, which demands nearly as much time as that of feeding. A generation ago we seldom heard of any disease of chickens excepting perhaps cholera. We kept no medicines on hand, neither did we feed condition powders to make hens lay whether they wanted to or not, or tonics or so-called egg foods; or patent grits; or patent nests; nor did we dose them with medicines just "to keep them well" or to make them moult easy, or lay continuous, or keep them from setting, etc.

To-day there are at least 50 so-called chick diseases, and as it is a profitable business for those who have cure-alls for sale, more diseases are being invented right along to suit the countless cure-alls, which don't cure at all and as a rule do more harm than good in the long run.

Tonics, purgatives, ointments, lung medicines, pills, liniments, etc., pay your money and take your choice, remembering that you also take your own chances. The manufacturer did his part in making the stuff and you do the rest and stand all consequences.

There is a class of people who are eternally dosing themselves with various concoctions for numerous imaginary ills, and this same class of people are the ones who are continually dosing their chickens.

There is one thing very evident to the reader of every poultry journal, and that is, the large number of preparations advertised and the number of factories doing nothing else but manufacturing cure-alls. Either croup or liver troubles are alarmingly prevalent, judging by the amount of medicines sold, or else it is being used simply as a preventive. The cheapest and surest remedy for roup is the hatchet—one dose crosswise of the neck about one inch back of the ears. Guaranteed or money refunded.

When we look back to our childhood days we wonder how those old time hens ever managed to go around singing their merry lay, and filling the egg baskets without any of our modern appliances and patents, and ignorant of the fact that there were some half hundred diseases lurking around to which they might have fallen prey without warning.

At the rate we are going now along this line where will we be in a few years more. The manufacturers of these various concoctions would lead us to believe that it is absolutely dangerous to be without a box or bottle of their sure-cure in case an epidemic should break out in our flocks. How many of you who are reading this article bought "red albumen" to make your hens lay, and at the same time helped the promoter of that great scheme to get rich. A man who will sell such a concoction ought to be made "to lay" exactly in the same style his red albumen made hens lay—dead.

People who make poultry diseases and also make so-called cure-alls are in it for the money, knowing that suckers are born at the rate of 60 every hour and that 59 of them bite at everything that comes along and usually swallow whole these smoothly worded advertisements without giving a thought as to consequences.

Throw away your drugs and keep them out of your reach during the next six months and you will not only save, but make more money from your poultry.

It costs money to advertise. Take your poultry journals now and look them over and see for yourself what it costs these people to tell you of their various remedies, and how each and every one is the only or the best. Take their word for it, but don't take their medicines. Beware of all drugs, stimulants, powders, pills, tonics, etc., in your poultry yards.

CORRESPONDENCE.

NOTES FROM HERSCHEL.

THE DUTCHMAN DISC PLOUGH.

SCAB AND SNOW.

SHEEP SALE REFORMS.

An esteemed correspondent, writing from Herschel under date August 9th, says :—

With reference to the Rotary Dutchman Disc Plough, from the points mentioned in the July issue of the *Agricultural Journal* it appears to be just the very thing for this part of the Colony, the N.E. frontier. I am, however, anxious to hear from some practical farmer who has actually *tried* this plough what his experience is. In this part of the country we have to plough over veld covered with thick tough grass to make new lands, and though no stones are visible on the surface, the plough sometimes strikes buried rocks which break the plough. If this new plough would simply ride over such places it would be a great benefit. I should like to hear how many oxen it requires to draw it (3 furrow plough) as we don't use horses up here for ploughing. Also are spare wearing parts obtainable?

It would be interesting to know how many Scab Inspectors have flocks of sheep of their own, and how many have scab amongst their own sheep.

In the middle of June we had the thermometer down to 5° above zero, and all the silver wattle, gum, and some other ornamental trees have been killed down to the ground. No such weather was ever known here before. The snow was in some places four feet deep on the flats and thousands of sheep perished. Thousands of birds perished also, especially ring doves. Namaqua doves and Namaqua partridges and even antbears were found dead in the veld.

In this country those attending stock sales often are put to much inconvenience for want of better arrangements for taking possession of their purchases. As soon as the animals are knocked down the gate of the kraal is opened and the animals run out helter skelter and often get mixed with other people's stock, and quarrels and even fighting have been known to occur amongst the claimants.

In Australia the cattle or horses are put into numbered pens and are sold by the number of the pen, and can remain till the owner is able to remove them.

Sore Teats.

To the Editor AGRICULTURAL JOURNAL.

Dear Sir,—In reference to sore teats in cows, I can highly recommend gall cure, which is mostly used for chafed horses; put a little on the teats before starting milking. The above can be purchased from Messrs. P. H. Parkes & Co., Grahamstown, at 1s. per tin.

I remain, yours faithfully,

E. HOWARTH

Sweet Kloof, P/O Alicedale,
9th August, 1902.

COUNTRY REPORTS.

Alexandria.

C. A. HORN, R.M., 7th August, 1902.—The agricultural prospects are very cheering at present. The farmers as well as natives are busy ploughing, and have been doing so since the beginning of June, when soft and continuous rain fell. The young crops are very promising. The weather has been very cold but stock have not suffered. The veld is in very good condition, and though forage is almost unobtainable, having been requisitioned by the military authorities, in all some 12,000,000 lbs., stock of all descriptions are in good condition and no diseases have been reported. Horses are extremely scarce and a hundred or two could easily be disposed of. Fruit growing, though much neglected in past years, is now receiving attention, and some thousands of choice trees are being planted, chiefly obtained from Western Province nurseries. Cattle are fetching good prices and the market is well supplied with butter and eggs.

Tsolo.

WM. CARLISLE, ACTG. R.M., 10th July, 1902.—During the early part of June we had a severe visitation in the shape of a hurricane accompanied by ice cold rain. Hundreds of stock of all kinds were killed, trees torn up by the roots, and considerable damage done to the crops. The pasturage shows signs of improving as several inches of rain fell. No disease amongst the stock reported.

QUERIES AND REPLIES.

A Pepper Tree Pest.

"R.S." writing from Bulawayo says:—"I have seen in Matabeleland a good many pepper trees which are suffering from the attacks of some beetle or insect. The stems are not attacked, but the smaller branches are ringed round by this pest in such a manner as apparently to allow of the circulation of the ascending, but not of the descending sap. Above and close to this ring the bark bulges out and swells, and this tumour seems to be used as a lodgment for eggs or larvæ. I have not discovered any insect or larva of any kind when cutting off the branch or examining it at the part affected, but the bark is perforated at the bulging part, as if by a small worm or caterpillar of some kind.

"The branch thus attacked becomes rough and scirrhous round about the ring, and the part above gradually withers and dies. The same fate seems in store for the tree itself, where the branches attacked are many. I should be glad to know the nature of the disease and its remedy in an early number of the *Agricultural Journal*."

I have not before heard of nor have I seen the injury to the pepper tree of which complaint is made, and would suggest the submittal of specimens of damaged sections of branches. The ordinary red-winged migratory locust is said to sometimes gnaw the bark from young wood in a band about a branch and in this way to cause the death of the shoot beyond. I have received peach twigs thus destroyed, and in these cases the bark beyond the girdled portion was much thickened. No larvæ was present in the abnormal growth, but such situations in general are favoured points of attack by various insects that have naught to do with primary injury.

C. P. LOUNSBURY.

A Dying Calf.

Mr. A. G. Hewitt, writing from Cradock, says:—"I would be very glad if you will give me information through your *Journal* with regard to the following case.

"We have a calf about eight months old, which about two weeks ago appeared rather seedy, and although it was kept at home and fed it gradually got worse.

"First of all the ears appeared to dry up, and later on all the extremities of the body first were puffed and soon after dried up.

The tail is completely dead and the legs up to the knee joints are dying off. Of course, needless to say the animal cannot use its legs. Latterly it has refused to eat. Is there any treatment or remedy for such a case? This is the only one out of a herd of 70 calves."

By this time I should imagine the animal is dead. Whether this may be or not, it should be destroyed. The cause of the disease is difficult to ascertain, but it appears to be due to want of proper nourishment. It may be due to bone-disease, but as the history is imperfect it is impossible to give a definite opinion.

D. C. CAMPBELL, M.R.C.V.S.

The Death's Head Moth Superstition.

Mr. M. H. Nesor, jun., of Lukas Kop, Philipstown, wrote to the Government Entomologist on the 18th of May as follows:—

By parcel post I am forwarding you a moth, known to us by the various names of bee-moth, poison-moth and death's-head moth. Will you be so good as to tell me if the crooked hook at the top of the body is a sting? And, if so, is it a poisonous one?

There is, as you are well aware, amongst our Afrikander folk a rooted idea concerning the poisonous character of this moth, which, as is believed, causes instant death by a single sting.

Almost all these opinions are caused by the fact that the moth inhabits the bee hives, where it damages the honeycomb by eating pieces and holes out of it. When the hive is opened the moth flies out and after a few minutes back again, and then stings men and animals happening to be in the neighbourhood.

Although I have, however, very little belief in these stories, yet I dare not deny them, and I will therefore be glad if you will tell me what is true and what untrue.

By an answer on the above, and an enlightenment by letter or through the *Agricultural Journal*, you will greatly oblige me.

The specimen I send (a male) is slightly under average in size, but I could not at the moment obtain a better one.

The larvæ of this sort feed on potato leaves, but apparently there are several other species, as I have noticed others feeding on vine leaves.

The Superstition and its Origin.

↑ BY C. P. LOUNSBURY, Government Entomologist.

The moth is a male specimen of *Manduca (Acherontia) atropos*, an insect commonly known as death's head moth in Europe and as bee moth in this country. Mr. Nesor must be quite familiar with the species to connect the adult with the larva and to distinguish

between the sexes! There is, as he supposes, no foundation for the old and curious tradition that the moth can inflict a mortal wound and that parties disturbing it from bee-hives run a grave risk of being attacked by it. The belief is said to have originated through natives (Hottentots) having told the early settlers the story in order to prevent the new-comers from taking the honey of wild bees that they, the natives, desired for themselves (Campbell's "Travels in South Africa"). The moth is a well-known insect on the continent of Europe and is occasionally found in England. The belief that it can inflict a fatal sting or even sting at all appears to be confined to South Africa, but other superstitions take the place of this one in Europe. Its presence in a dwelling is thought by the peasantry to be an omen of approaching evil or of a death in the family within a year. Probably these wild stories have retained their hold from generation to generation through wonder and dread at the weird marking, somewhat resembling the upper half of the human skull with cross-bones beneath, that occurs on the back of the moth, and the plaintive squeaking sound which the insect makes when disturbed. How it contrives to pacify the bees whose honey it steals is, I believe, still unexplained. Some suggest that the squeaking noise it makes so closely resembles the note of the queen bee that the workers have grown to respect its person; others, that the hairy covering of the body is a sufficient protection.

The tradition that the moth returns to the hive when disturbed from it and will sting the intruder if he lingers near seems quite general throughout the Colony, and many a farmer who would coolly face an infuriated cock ostrich will beat a hasty retreat in terror at the squeak of this harmless insect. I, as well as many of my acquaintances, have handled the moth with perfect impunity, and only once have I heard of anybody having been treated to a sting. The exception is Mr. L. Peringuey, the entomologist of the South African Museum, who tells me that on his picking up one specimen that had been brought in to him, he received a sharp prick. It is not unreasonable to suppose that other people have been similarly "stung," and one can imagine that blood poisoning might in some one case have followed such a trivial prick, even as it may the merest scratch of a pin, and thus have given rise, in minds predisposed by superstitious dread at the skull-like marking and peculiar squeak, to a notion that the insect could normally inflict a fatal wound. A slight support to the suggestion that the moth in some manner occasionally pricks the skin is to be found in Burmeister's *Manual of Entomology*, page 381, where is given a short account of a letter from a Dr. Reich at the Cape, published in *Isis* during 1831 and concerning the bee-moth. It is said that the insect defends itself by stinging, that the puncture is painful, and that swelling and inflammation soon follow. Yet it may be that Dr. Reich had no more basis for his communication than the popular tradition.

So sudden and unexpected was the attack in Mr. Peringuey's case that he failed to detect how it was made; and, unfortunately, he

returned the specimen without observing its sex. Some claim that the short, stout proboscis is the stinging organ, whilst others with equal positiveness assert that the sting is at the end of the abdomen. That the male intromittent organ is the instrument was stated by Dr. Reich to be the current belief in his time.

The publication of Mr. Nesor's letter and of the above comments has been delayed pending an answer to an enquiry on the subject at once made to Dr. T. A. Chapman, an English entomologist whom I knew to be familiar with the insect. Dr. Chapman, in his reply, expresses surprise at the suggestion that the moth can sting and says that he can only imagine it able to injure a very delicate skin, and even in that case only by giving a slight prick with its torsal (foot) claws. "A year ago," he continues, "the moth was common in England. I handled several, and many hundreds were handled, not a few by friends of mine whom I see frequently, yet I have not heard anyone entertain a suspicion that it can hurt or even tries to hurt anyone."

Perhaps some reader is able to tell more regarding the superstition or can recount incidents of persons having suffered injury in handling specimens of the moth.

Spray Pumps—Correction.

In the August issue of the *Journal* it was stated under the above heading that lime, salt and sulphur mixture should not be used with the Success Spray Pump. This is an obvious mistake, which arose through our correspondent accusing the Success Pump of being fitted with a copper piston-rod. The piston-rod is of brass, and the mixture, therefore, does not injure it.

Incubators.

A correspondent writing from the northern districts of the Colony asks us to recommend an incubator for poultry and ostriches. As this is a question that may be troubling a good many people, we may state that an American incubator, the Cyphers, has lately come to the fore and is reported to have attained results which are very satisfactory. Messrs. Findlay & Co., of Cape Town, are the agents who can supply all particulars.

The Produce Market.

CAPE TOWN.

Messrs. Wm. Spilhaus and Co. report under Saturday's date, Aug. 30, as follows:—

Ostrich Feathers.—Our local market was well supplied this week. The offerings chiefly consisted of wings. Competition on all superior goods was keen, but for seconds and thirds, whites and feminas, there is only a limited demand, and these only bring about valuations. Good long and long medium dark goods are also sought after, but medium and short are still neglected, and are only saleable at very low rates. Business for the day 945 lb., which sold for £2,929.

					£ s. d.	£ s. d.
Whites (primes) ..	..	..	..	..	10 10 0	15 0 0
Firsts ..	..	..	..	..	7 10 0	10 0 0
Seconds ..	..	..	..	..	5 10 0	6 10 0
Thirds ..	..	..	..	..	4 0 0	4 10 0
Inferior and stalky	..	..	..	..	1 10 0	2 0 0
Byocks ..	..	..	..	..	4 10 0	6 0 0
Feminas (super) ..	..	..	..	..	6 0 0	8 0 0
Firsts ..	..	..	..	..	4 10 0	5 10 0
Seconds ..	..	..	..	..	3 0 0	4 0 0
Thirds ..	..	..	..	..	2 0 0	2 10 0
Inferior ..	..	..	..	..	0 15 0	1 0 0
Dark ..	..	..	..	..	3 10 0	5 0 0
Spadonas (White) ..	..	..	..	..	1 10 0	2 0 0
Light and Dark ..	..	..	..	..	0 10 0	1 0 0
Boos (White) ..	..	..	..	..	1 0 0	1 5 0
Light ..	..	..	..	..	0 17 6	1 2 6
Black Butts ..	..	..	..	..	0 7 6	0 10 0
Dark ..	..	..	..	..	0 7 6	0 10 0
Inferior ..	..	..	..	..	0 3 0	0 5 0
Blacks (Long) ..	..	..	..	..	4 10 0	5 10 0
Long Medium ..	..	..	..	..	2 10 0	3 10 0
Medium ..	..	..	..	..	1 0 0	1 10 0
Short ..	..	..	..	..	0 5 0	0 10 0
Long Floss ..	..	..	..	..	1 5 0	1 10 0
Medium Floss ..	..	..	..	..	0 7 6	0 10 0
Short Floss ..	..	..	..	..	0 2 6	0 5 0
Drabs (Long) ..	..	..	..	..	2 0 0	3 0 0
Long Medium ..	..	..	..	..	1 5 0	1 10 0
Medium ..	..	..	..	..	0 10 0	1 0 0
Short ..	..	..	..	..	0 2 0	0 4 0
Long Floss ..	..	..	..	..	1 5 0	1 10 0
Medium ..	..	..	..	..	0 5 0	0 10 0
Short ..	..	..	..	..	0 2 0	0 3 0
Inferior Long Blacks and Drabs ..	..	..	..	..	0 15 0	1 0 0
Floss ..	..	..	..	..	0 4 0	0 5 0
Wiry ..	..	..	..	..	0 0 6	0 0 6
Chicks ..	..	..	..	..	0 0 6	0 1 0

Wool.—Since our last, about 340 bales were offered. Grease wools were firm at last sale's prices. Some of the lots were declared not sold, sellers' limits being above buyers' ideas. Among the parcels offered were some new season wools from Prince Albert district. These were light, and realised 6½d. to 7½d. respectively. Heavy and irregular wools are neglected. Extra super snow-whites sold at from 1s. 5½d. to 1s. 6½d. per lb. We quote: Karoo grease for combing, 6d. to 7½d. per lb.; Karoo grease for scouring, 4½d. to 5½d. per lb.; snow-whites, ordinary, 1s. 1d. to 1s. 2d. per lb. snow-whites, super, 1s. 3½d. to 1s. 5½d. per lb.; snow-whites, extra super, 1s. 5½d. to 1s. 6½d. per lb.

Skins.—From cable news received this morning we learn that at the London sheep-skin sale, held yesterday, prices were rather lower. Here rates have not as yet been fixed, and in the meantime our quotations are nominal. Goatskins are unchanged. We quote: Merino long wools, 5d. to 5½d. per lb.; short wools, 4½d. to 4¾d. per lb.; damaged and pelts, 3½d. per lb.; bastards, 3½d.; Capes sound, 1s. 9d. each; cut, 1s.; damaged, 6d. (are nominal); goatskins, 10d. per lb.; sundried, 6d. per lb.; scurry, 6d. each; other descriptions according to quality.

GOVERNMENT NOTICES.

Fly Netting for Fruit Trees.

With reference to notice dated 9th June, it is hereby notified that the Board has still a quantity of fly or mosquito netting for disposal. Applications for same should be addressed to the undersigned.

Cost from 7s. to 8s. per piece, 120 ft. by 70 ins.

C. MAYNE, Secretary.

Western Province Board of Horticulture,
Stellenbosch, 1st September, 1902.

Cattle from Queensland, United States of America and Argentina.

REGULATIONS FOR IMPORTATION.

By command of His Excellency the Governor, the following Proclamation No. 138, 1902, is published in the *Government Gazette* --

Under and by virtue of the powers and authorities vested in me by the provisions of Act No. 27 of 1893, entitled "The Animal Diseases Act, 1893," I do hereby proclaim, declare and make known that, in terms of Section 6 and 7 of the Act aforesaid, I have issued and do hereby issue the following Regulations, as set forth in the Schedule hereunto annexed, regarding the importation or introduction of cattle into this Colony from the State of Queensland (Australia), the United States of America and Argentina.

And I do hereby declare that these Regulations shall have effect from and after the 1st September, 1902, and shall continue in force until amended or repealed.

Schedule to foregoing Proclamation.

REGULATIONS REGARDING THE IMPORTATION OF CATTLE FROM QUEENSLAND, UNITED STATES OF AMERICA AND ARGENTINA.

1. Cattle from the abovementioned countries, may be landed at the Ports of East London and Port Elizabeth, subject to inspection and issue of Clean Certificate at such port as provided by law.

2. Such Cattle may also be landed at the Ports of Cape Town and Mossel Bay, provided they are accompanied by a Certificate in the subjoined form.

CERTIFICATE.

I do hereby certify that the undermentioned cattle are free from disease, and have not come from a locality in which the disease known as Redwater, Texas Fever, Tick Fever, or Tristeza is indigenous, and in which healthy cattle from non-infected areas are liable to become infected with the said disease.

Number and general description of cattle.....

Place from which cattle have come.....

Name of consignee at Cape Town or Mossel Bay.....

.....

Signature*.....

Title.....

Place

Date.....

*To be signed by an Officer specially authorized to perform the duty by the Government or State Administration of the country from which the cattle are shipped.

Redwater in Rhodesia.

PROHIBITION OF INTRODUCTION OF CATTLE FROM SOUTHERN RHODESIA.

By command of His Excellency the Governor the following Proclamation No. 139, 1902, is published in the *Government Gazette*:—

Whereas the disease known as Redwater is prevalent amongst cattle in Southern Rhodesia:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of cattle from Southern Rhodesia into any part of this Colony shall be and is hereby prohibited, and that all cattle which may enter this Colony in contravention of this Proclamation shall be liable to be destroyed.

And I hereby declare that this Proclamation shall have effect from and after the date hereof, and shall continue in force until amended or repealed.

And I do strictly charge every Resident Magistrate, Field-cornet and Justice of the Peace to see that this Proclamation is obeyed, and to bring to justice any person who may contravene the same.

Rinderpest.

COMPULSORY INOCULATION.

By command of His Excellency the Governor, the following Proclamation No. 103, 1902, is published in the *Government Gazette*.—

Under and by virtue of the powers and authorities vested in me by the provisions of Act No. 2 of 1897, entitled "The Animals Diseases Rinderpest Amendment Act, 1897," I do hereby proclaim, declare and make known that I have issued and do hereby issue the following Regulations, as set forth in the Schedule hereunto annexed, for arresting the spread of Rinderpest.

And I do hereby further proclaim and make known that any person contravening any of the said Regulations shall be liable to a fine not exceeding fifty pounds, or in default of payment thereof to imprisonment with or without hard labour for any period not exceeding three months, unless such fine be sooner paid.

Schedule to foregoing Proclamation.

1. When Rinderpest has either already appeared or hereafter appears in any part of this Colony, all cattle which are infected with the disease or which may be in contact with infected cattle shall be forthwith inoculated either with serum or with glycerinated bile.

2. The inoculation shall be performed by the owner or person in charge of the cattle, or if he fail to do so, by a duly authorized officer of the Government, and the cost of the inoculation shall be borne by the owner or person in charge of the cattle.

3. No person shall, without the special permission of the Secretary for Agriculture, perform inoculation against Rinderpest with the pure bile or with virulent blood of animals affected with Rinderpest.

Quarantine at Barkly East.

By command of His Excellency the Governor, the following Proclamation No. 141, 1902, is published in the *Government Gazette*:—

Under and by virtue of the powers and authorities in me vested by Act No. 27 of 1893, I do hereby proclaim, declare and make known that the farms "Avondzon," "Ben Nevis," "Lyndale," "Sandham" and "Lijgerkrantz," in the District of Barkly East, are hereby declared to be infected areas for the purposes and within the meaning of the Act aforesaid, from which no animal shall be removed save as provided for under any Regulations now existing or that may be issued from time to time in that behalf, and shall from the date hereof be subject to the Regulations which have been or may hereafter be promulgated for arresting the spread of *Rinderpest*.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM BASUTOLAND.

By command of His Excellency the Governor the following Proclamation No. 63, 1902, was published in the *Government Gazette* of April 22nd, 1902 :—

Under and by virtue of the powers vested in me by the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," and the Act No. 2 of 1897, entitled the "Animal Diseases Rinderpest Amendment Act, 1897," I do hereby proclaim, declare and make known that, whereas the disease known as Rinderpest is prevalent amongst cattle in Basutoland, it shall not be lawful, from and after the date hereof, to introduce or to cause or allow Horned Cattle to be introduced from Basutoland into any part of this Colony, save and except cattle in yoke and accompanied by a certificate, to be obtained and held by the person in charge of such cattle, signed by a competent and responsible officer, to the effect that such cattle are free from infectious or contagious disease and have not been in contact with infected animals or come from a locality where any such disease shall be known to exist.

And I do hereby proclaim and make known that all Horned Cattle which may enter this Colony in contravention of this Proclamation shall be liable to be destroyed.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM ORANGE RIVER COLONY AND THE TRANSVAAL.

By command of His Excellency the Governor, the following Proclamation No. 139 1901, was published in the *Government Gazette* of August 16th, 1901 :—

Under and by virtue of the powers vested in me by the "Animal Diseases Act," No. 27 of 1893, and by the "Animal Diseases Rinderpest Amendment Act," No. 2 of 1897, I do hereby proclaim, declare and make known that it shall not be lawful, from and after the date hereof, to introduce or to cause or allow Horned Cattle to be introduced into any part of this Colony from the Orange River Colony and the Transvaal, save and except such cattle as may be required to be introduced by the Government for the purpose of supplying Bile or Serum for inoculation against Rinderpest :

And I do hereby proclaim and make known that all Horned Cattle which may enter this Colony in contravention of this Proclamation shall be liable to be destroyed

And I do hereby further declare that this Proclamation shall have effect from and after the date hereof, and shall continue in force until amended or repealed.

Proclamation No. 217, bearing date the 29th day of October, 1900, together with the regulations issued thereunder, is thereby repealed.

And I do strictly charge every Resident Magistrate, Field-cornet and Justice of the Peace to see that this Proclamation is obeyed, and to bring to justice any person who may contravene the same.

Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined Regulation for checking the spread of the infection is republished.

REGULATION ISSUED UNDER PROCLAMATION No. 30, DATED 20TH JANUARY, 1899.

Whenever under the provisions of Sections 11 and 12 of Act No. 27 of 1893, any area is declared or proclaimed to be an area infected with Rinderpest, it shall not be lawful for any person, animal, animal produce, article or thing, who or which may, in the opinion of the Magistrate of the District in which such area is situated, be liable to convey infection of Rinderpest, to leave or to be removed therefrom.

Inoculation Against Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of the Colony, it is desirable to inform stock-owners of the intentions of the Government as to dealing with the outbreak should it unfortunately become general in the Colony, and to advise stock-owners as to the best course to follow.

The Government propose that, as a general rule, cattle-owners themselves should perform the inoculation. Glycerinated Bile will be used, though circumstances may arise where it will be preferable to use Serum.

Bile Stations will be established in suitable places as necessity arises in localities where farmers have agreed to contribute the required proportion, say 5 per cent., of their cattle for production of the bile. It must be clearly understood that unless farmers are prepared to thus contribute the necessary cattle, it will be impossible for them to have the benefit of a Bile Station.

Glycerinated Bile will be issued free to contributors in proportion to the number of cattle contributed to a Bile Station. To non-contributors a fair charge will be made for bile if any be available for issue.

Serum will be charged for at the rate of £1 per bottle of ten doses.

A limited supply of Glycerinated Bile to meet emergencies will, for a time, be available, free of charge, from the Bile Station which has been established under arrangements with the Imperial Military authorities near Aliwal North.

As occasion requires, Demonstrators will be sent to instruct farmers in the method of inoculation, free of charge. They will, as a rule, inoculate only enough cattle to show how it is to be done, leaving the owner to continue the work. The Government will supply syringes on application to the Resident Magistrate, or to the Demonstrators at the following charges:—20 cc. capacity, 20s; 10 cc. capacity, 15s. This payment may be recovered on return of the syringe to the Magistrate, in good order.

After the experience gained during the outbreak of 1896-1898, the Colonial Veterinary Surgeon wrote* as follows:—

"The method of inoculation which I would recommend in future sporadic outbreaks of the disease is briefly as follows:—

"*Infected Herds.*—These should be inoculated at once with either serum or glycerinated bile; every animal which indicates infection by a rise of temperature should receive a large dose of not less than 100 cc. of serum, or 30 cc. of glycerinated bile; the latter should, by preference, be injected into the jugular vein, so as to secure its immediate action. Then from eight to twelve days after, all the animals in the herd which give no indication of being infected with the disease, or fever temperature should receive an injection of pure bile; not less than 10 cc., and for large animals 20 cc. This will confer a lasting immunity sufficient for all practical purposes.

"*Clean Herds.*—When it is decided to inoculate a clean herd, which is in danger of becoming infected through its proximity to diseased cattle I would recommend that the animals composing the herd should be inoculated first with 20 cc. of glycerinated bile, and to follow this inoculation in from eight to twelve days with an injection of from 10 to 20 cc. of pure bile. This will confer a strong and lasting immunity on the animals in the herd, and will be free from risk arising from the inoculation or of introducing the disease.

"*Use of Pure Bile.*—Pure fresh bile should not be used in an infected herd, if any of the other inoculating materials can be obtained, as it tends to intensify the character of the disease in those already infected, and its immunising effect is too slowly developed to protect the healthy cattle against infection, if they are left in contact with those already sick. If no other means are available, however, the temperatures of the whole of the cattle in the infected herd should be carefully taken by the clinical thermometer, and only those which register a normal temperature should be inoculated with pure bile, the others should be separated from the inoculated lot at once, and carefully tended. If glycerine can be obtained, the spare bile should be mixed with it in the proper proportions—one part of glycerine to two parts of bile. This mixture, after standing forty-eight hours, may be injected into the affected animals in large doses, not only with safety, but with marked benefit.

"*Preparing the Bile.*—The bile should be taken from an affected animal immediately after death, or from one which is killed in the last stage of collapse.

* See *Agricultural Journal*, June 6, 1899, in which will be found a full consideration of the different methods of inoculation.

"Biles of all shades of colour—except those which are red from the presence of blood—may be used, so long as they are clear and free from a putrid smell. Thin light yellow biles should also be rejected.

"All the galls extracted at one time should be mixed together, after standing separately for twelve to eighteen hours, so as to render them uniform in strength and immunising properties. Pure bile should be used on the second day after being drawn, unless it is kept in an ice chest, when it may be kept sweet much longer. But if pure bile is used as a second inoculation only, as above directed, it is not desirable to keep it longer than twenty-four hours.

"Glycerinated bile is made by adding one part of glycerine to two parts of bile, stir the mixture well, then mix all the biles taken at one time, and allow them to stand for eight days. But if there is urgency, the glycerinated bile may be used forty-eight hours after it is mixed.

"I would strongly recommend that in every outbreak of the disease that occurs, every drop of suitable bile, obtained from the animals which die, should be mixed with glycerine in proper proportions, two parts of the bile to one of glycerine, so that it may be preserved and made available for the inoculation of infected herds, and also for the first inoculation of clean herds which may be considered in danger. Pure bile for the second inoculation of clean herds can always be obtained when the disease appears in any locality, which would be the only reason for inoculating clean herds in the immediate vicinity."

Taking the Bile.—To remove the bile the animal must be laid on its left side, the skin and flesh on the right side immediately behind the last rib being cut through; the ribs being raised, the gall bladder will become visible. The gall bladder should be then punctured with a small knife and the gall allowed to escape into a wide-mouthed bottle. If wide-mouthed bottles are not available then ordinary whisky bottles may be used with an enamelled funnel, which can be procured at any country store. Every precaution must be taken that the operation is performed in a thoroughly clean manner, the hands of the operator and all knives, &c., being thoroughly cleansed before use.

Inoculating.—After having secured the animal to be operated upon, the necessary dose of bile is injected under the skin of the dewlap by means of a Hypodermic Syringe, care being taken that the point of the needle is not inserted into the flesh, but between the skin and flesh.

Symptoms of Rinderpest.

The Outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined description of the symptoms of Rinderpest is hereby published:—

The early symptoms of Rinderpest are a rise of internal temperature to 106° or 107° Fahr.; the animal stands with its head hanging down, ears drawn back and coat staring; it refuses all food and occasionally shivers. A mucous discharge flows from the eyes and nostrils; the extremities are cold, and the breathing is laboured and frequently accompanied with moaning. The inner part of the upper lip and roof of the mouth and all visible mucous membranes are reddened, and covered with an eruption of minute pimples, and later with a branlike exudation. The bowels are occasionally constipated, but in most cases diarrhoea sets in, the evacuations being slimy and very frequently of a dirty yellow colour. The prostration of strength is great, the animal staggering when made to move. In milch cows the secretion of milk is rapidly diminished, and soon ceases altogether. The disease usually ends fatally in from six to ten days.

It is generally believed that the infection is produced through the respiratory organs; from there the contagion becomes generalised. The contagion exists in the secretions and excretions, urine, saliva, mucous secretions of the nose, mouth and eyes, in the sweat, expired air, blood, and in all the tissues. It may be conveyed directly by the diseased animals, or indirectly by the dung, the bedding, the earth, hides, wool, meat, clothing, wagons or vessels, by people, dogs, sheep and chickens, &c. Contagion takes place only through short distances. When the weather is dry this is reduced to its minimum (about 27 yards), and the progress of the disease may be stopped by a ditch separating the diseased from the healthy animals.

In order to detect the earliest symptoms of Rinderpest, owners of horned cattle are warned of the urgent necessity for keeping a constant and close watch upon their stock. Any suspicious cases should be immediately reported to the nearest Resident Magistrate,

Field-cornet or Police Officer, and the sick animal kept separate till an inspection is made. Stock should be carefully examined daily by a responsible person, more particularly for any symptoms resembling those above described.

Locust Disease Fungus.

The attention of landowners and others is drawn to the provisions of Government Notice No. 1123 of 1897, wherein it is notified for general information that supplies of Locust Disease Fungus may be obtained from the Director of the Bacteriological Institute, Graham's Town, at a cost of sixpence per tube to all applicants residing in the Colony. Applicants beyond the borders of the Colony are required to pay the cost of postage in addition to the amount charged.

As the Fungus is cultivated on a moist jelly and is therefore liable to become dried up and useless if kept long on hand, it is not found possible to store supplies in the various districts of the Colony; and applicants desirous of trying the Fungus should therefore submit their applications, with a remittance for the quantity applied for, *direct* to the Director, who can always supply the Fungus in proper condition and on short notice.

Lung-Sickness.

INTRODUCTION OF CATTLE FROM OVER THE ORANGE RIVER.

By command of His Excellency the Governor, the following Proclamation was published in the *Government Gazette* of the 30th October, 1900:—

Whereas by virtue of the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," it is enacted that it shall be lawful for the Governor by Proclamation in the *Gazette*, to prohibit the importation or introduction into this Colony from any place beyond the same in which any infectious or contagious disease affecting animals shall be known or be supposed to be prevalent, of any such animals as in such Proclamation shall be mentioned.

And whereas the disease known as Lung-sickness (Pleuro-pneumonia) is prevalent amongst cattle in the Transvaal and the Orange River Colony:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of Cattle from the Transvaal and the Orange River Colony, save by road by way of Aliwal North, Bethulie Bridge or Norval's Pont, and subject to the regulations set forth in the Schedule hereto, shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Schedule to the foregoing Proclamation.

(1) No cattle shall be introduced into this Colony from the Transvaal or the Orange River Colony by railway.

(2) No cattle shall be introduced into this Colony from the Transvaal and the Orange River Colony by road,

(a) Unless the person in charge of such cattle shall have obtained and have in his possession a certificate with regard to such cattle, in the form set forth in Schedule A hereto, signed by a competent and responsible officer or person delegated for this purpose by the Government of the Transvaal or the Orange River Colony, and

(b) Unless such certificate shall have been countersigned or endorsed by the Inspector appointed for this purpose by the Colonial Government at Aliwal North, Bethulie Bridge, or Norval's Pont.

(3) No person intending to introduce cattle from the Transvaal or the Orange River Colony, shall be permitted to introduce such cattle unless he shall have obtained the aforesaid endorsement, and he shall, with that view, give timely notice to the Inspector, stating the number of cattle and the place, within 3 miles of Aliwal North, Bethulie Bridge and Norval's Pont, where the cattle may be inspected, and the proposed time of introduction; and upon receipt of such notice the Inspector shall proceed at the time and to the place specified in such notice, or as soon thereafter as may be possible, then and there to examine such cattle.

(4) The person in charge of such cattle shall be bound to produce the certificate aforesaid to the Inspector, and such Inspector shall, if the certificate be in order, and the cattle be free from disease, make an endorsement on the certificate in the form given in Schedule "B" hereto, and the cattle may thereafter proceed on their way. The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, duly endorsed, to any Field-Cornet, Police Officer or owner of land over which the cattle may pass or be passing.

(5) In the absence of the Certificate prescribed in regulation (2) the cattle shall be quarantined for a period not less than twenty-one days at some place on the north bank of the Orange River and in the neighbourhood of Aliwal North, Bothulia Bridge and Norval's Pont where they may be inspected by an Officer of the Colonial Government, appointed for the purpose, at such intervals as may be considered necessary.

(6) On the expiration of the period of quarantine the Inspector, should he be satisfied that the cattle are free from disease, shall issue a Certificate in the form set forth in Schedule C hereto.

(7) The person in charge of such cattle as are referred to in the Certificate mentioned in regulation (6) is liable to be called upon to produce such Certificate to any Field-Cornet, Police Officer or owner of land over which such cattle may pass or be passing.

(8) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for any period not exceeding three months unless such fine be sooner paid.

SCHEDULE A.

I hereby certify that the undermentioned Cattle either have not mixed with and Cattle affected with Lung sickness and are free from disease: or have been effectively inoculated against Lung-sickness and are free from disease, viz.:—

Number and general	.....
description of	.....
Cattle	.....
Owner's name and	.....
address	.....
In charge of.....	.....
Place to which Cattle are being sent.....	.....
	(Signature).....
	(Address).....
Date.....	.....

SCHEDULE B.

(Endorsement to be made by the Inspector.)

I hereby certify that I have examined the Cattle to which this Certificate refers and find them to be free from disease.

	(Inspector's Signature).....
	(Address).....
Date.....	.....

SCHEDULE C.

I hereby certify that the Cattle to which this Certificate refers have undergone a period of quarantine for at least twenty-one days, that I have examined them and find them to be free from disease, viz.:—

Number and general	.....
description of	.....
Cattle	.....
Owner's name and	.....
address	.....
In charge of.....	.....
Place to which Cattle are being sent.....	.....
	(Inspector's signature).....
	(Address).....
Date.....	.....

RAINFALL, JULY, 1902.

NOTE: n.r. denotes that, up to the date of publication, Returns have *not* been received from those Stations.

I. CAPE PENINSULA:

	INCHES.
Royal Observatory, 12 inch gauge ..	4.59
Cape Town, Town House ..	3.90
Do. S. A. College ..	6.82
Do Sea Point Hall ..	3.55
Do Molteno Reservoir ..	5.94
Do Platteklip ..	7.44
Do Signal Hill ..	2.98
Table Mountain, Disa Head ..	4.93
Do Kasteel's Poort ..	13.76
Do Waai Kopje ..	13.03
Do St. Michael's ..	15.75
Devil's Peak, Block House ..	10.77
Do, Nursery Gauge ..	9.78
Do, Lower Gauge ..	8.87
Rondebosch ..	n.r.
Newlands (Montebello) ..	14.26
Bishopscourt ..	n.r.
Claremont ..	11.97
Kenilworth ..	11.97
Wynberg (St. Mary's) ..	11.53
Groot Constantia ..	8.98
Tokai ..	7.04
Simon's Town (Wood) ..	5.66
Do. (Gaal) ..	5.42
Blaauwberg Strand ..	n.r.
Robben Island ..	4.08
Strandfontein ..	5.24
Camp' Bay ..	3.04
Fish Hoek ..	5.17
Cape Point ..	1.06
Smith's Farm, Cape Point ..	4.95
Woodstock ..	5.43

II. SOUTH WEST:

Eerste River ..	4.82
Klapmuts ..	4.95
Stellenbosch (Gaal) ..	5.44
Somerset West ..	5.20
Paarl ..	6.39
Wellington (Gaal) ..	5.29
Do. (Huguenot Seminary) ..	n.r.
Tulbagh ..	2.96
Kluitjes Kraal ..	4.85
Ceres ..	11.31
Rocklands ..	n.r.
Caledon ..	1.52
Do. (Gordon) ..	2.48
Worcester (Gaal) ..	2.13
Do. (Meiring) ..	1.85
Hex River ..	2.51
Lady Grey (Div. Robertson) ..	0.79
Robertson ..	0.94

II. SOUTH-WEST—continued.

	INCHES
Robertson (Govt. Plantation) ..	0.86
Montagu ..	1.32
De Hoop (Div. Robertson) ..	1.41
Wetevreden (Groot Drakenstein) ..	6.38
Porterville Road ..	4.40
De Doorns ..	2.06
Danger Point ..	3.41
Viueboom's River ..	7.64
Bethlehem (Stellenbosch) No. 1 ..	12.52
" " No. 2 ..	8.98

III. WEST COAST:

Port Nolloth ..	0.13
Do. (Howard) ..	n.r.
Klipfontein ..	0.61
Kraaifontein ..	n.r.
O'okiep ..	0.36
Springbokfontein (Gaal) ..	0.62
Concordia ..	n.r.
Garies ..	n.r.
Kersfontein ..	2.98
The Towers ..	3.35
Dassen Island ..	2.66
Malmesbury ..	n.r.
Piquetberg ..	n.r.
Van Rhynsdorp ..	n.r.
Clanwilliam (Gaal) ..	0.96
Do. (Seydell) ..	1.80
Welbedacht ..	n.r.
Hopetfield ..	n.r.
Lilyfontein ..	n.r.
Zoutpan ..	2.20
Wupperthal ..	1.38

IV. SOUTH COAST:

Cape L'Agulhas ..	2.83
Bredasdorp ..	2.63
Swellendam ..	2.55
Heidelberg ..	1.01
Riversdale ..	1.12
Dumbie Dykes ..	0.86
Mossel Bay ..	1.25
George ..	1.40
Ezelzagt ..	n.r.
Millwood ..	2.39
Sour Flats ..	1.62
Concordia ..	2.75
Knysna ..	2.37
Buffels Nek ..	2.93
Harkerville ..	2.38
Plettenberg Bay ..	2.41
Forest Hall ..	n.r.
Blaauwkrantz ..	2.96

IV. SOUTH COAST—*continued*. INCHES.

Storm's River	3-61
Witte Els Bosch	4-99
Humansdorp	2-17
Cape St. Francois	2-20
Hankoy	0-90
Witteklip	1-69
Van Staaden's (upper)	1-64
Do. (lower)	1-55
Uitenhage	0-70
Do. (Inggs)	0-61
Do. (Park)	0-72
Dunbrody	0-13
Port Elizabeth (Harbour)	1-62
Walmer Heights (near Port Elizabeth)	2-18
Tankatara	0-88
Lottering	2-98
Shark's River (Nursery)	2-10
Do. (Convict Station)	n.r.
Grootvader's Bosch	n.r.
Karnmelks River	2-82
Armadales	0-53
Zuurbrak	3-25
Kruis River (Uitenhage)	0-68

V. SOUTHERN KARROO:

Touws River (D. E.'s Office) ..	1-12
Ladismith	0-67
Amalienstein	0-97
Calitzdorp	0-15
Oudtshoorn	0-42
Vlaakte Plaats	n.r.
Unionsdale	0-79
Kleinpoort	0-36
Glenconnor	n.r.
Verkoerde Vlei	1-74
Bok River	2-37
Triangle	1-37
Seven Weeks Poort	n.r.
Pietermoutjes	1-20

VI. WEST CENTRAL KARROO:

Matjesfontein	0-89
Fraserburg Road	n.r.
Prince Albert	n.r.
Do. Road	n.r.
Zwartberg Pass	2-55
Beaufort West	0-12
Dunedin	n.r.
Nel's Poort	n.r.
Camfer's Kraal	0-00
Lower Nel's Poort	0-02
Baaken's Rug	0-00
Willowmore	0-39
Steytlerville	0-11
Roosplaats	n.r.
Laingsburg	0-33
Rietfontein	0-12

VII. EAST CENTRAL KARROO:

Aberdeen (Gael)	0-02
Do. (Bedford)	n.r.
Aberdeen Road	n.r.

VII. E. C. KARROO—*continued* INCHES

Rietfontein	n.r.
Winterhoek	0-03
Klipdrift (De Erf)	n.r.
Kendrew	0-04
Graaff-Reinet	0-11
Do. (College)	0-05
New Bethesda	n.r.
Roodo Bloem	0-03
Wellwood	n.r.
Do. Mountain	n.r.
Jansenville	0-33
Patrysfontein	n.r.
Toegedacht	0-00
Klipfontein	0-08
Cronomers	0-22
Pearston	0-23
Somerset East	0-72
Do. (College)	1-68
Longhope	n.r.
Middleton	n.r.
Corndale (Div. o Aberdeen) ..	n.r.
Cookhouse	n.r.
Doornbosch, Zwagershoek	n.r.
Middelwater	0-20
Darlington	n.r.
Bloembhof	0-00
Arundale	0-31

VIII. NORTHERN KARROO:

Calvinia	n.r.
Middelpost	n.r.
Sutherland	0-66
Rheboksfontein	0-00
Fraserburg	n.r.
Onderste Doorns	n.r.
Droogfontein	n.r.
Gannapan	0-00
Carnarvon	0-00
Wagenaar's Kraal	0-00
Brakfontein	n.r.
Vogelstruisfontein	0-00
Victoria West	0-00
Bristown	0-00
Murraysburg	0-21
De Kruis	0-50
Richmond	n.r.
De Aar	n.r.
Middlemount	n.r.
Ilanover	0-03
Phillip's Town	0-10
Boschfontein	0-04
Petrusville	n.r.
The Willows	n.r.
Naauppoort	0-05
Middelburg	0-00
Colesberg	0-09
Tafelberg Hall	n.r.
Rietbult (Colesberg Bridge) ..	0-06
Stonehills	n.r.
Craddock	0-00
Do. (Rose)	n.r.
Varsch Vlei	n.r.
Witmoos	0-00

VII. E. C. KARROO—continued	INCHES	X. SOUTH-EAST—continued.	INCHES
Steynsburg ..	0·21	Salem ..	0·60
Do. (Nesemann) ..	0·20	Graham's Town (Gaal) ..	0·71
Daggaboer's Nek ..	n.r.	Do. (Bact. Inst.) ..	0·63
Springfield ..	n.r.	Heatherton Towers (near	
Quagga's Kerk ..	n.r.	Graham's Town) ..	0·11
Tarkastad ..	0·16	Fort Beaufort ..	0·18
Drummond Park ..	n.r.	Katberg ..	0·51
Riet Vlei ..	n.r.	Balfour ..	0·41
Brand Vlei ..	n.r.	Seymour ..	0·11
Williston ..	n.r.	Glencairn ..	n.r.
Omdraai's Vlei ..	n.r.	Alice ..	0·61
Zwagersfontein ..	n.r.	Lovedale ..	n.r.
Varken's Kop ..	0·00	Port Alfred ..	0·95
Culmstock ..	n.r.	Hog-back ..	n.r.
Doorskuilen ..	n.r.	Thaba N'doda ..	n.r.
Houwater Dam ..	n.r.	Peddie ..	0·50
Hillmoor ..	0·26	Cathcart ..	0·23
Glen Roy ..	n.r.	Keiskama Hoek ..	n.r.
Fish River ..	n.r.	Crawley ..	0·17
Spitzkcp ..	0·00	Thomas River ..	0·00
Phizantefontein ..	n.r.	King William's Town ..	0·41
Biesjesdam ..	n.r.	Do. Hospital ..	0·62
Groot Vley, Theebus ..	n.r.	Stutterheim (Wylde) ..	0·24
Kleinhaasfontein ..	0·09	Do. (Besté) ..	0·21
Scorpion's Drift ..	0·00	Dohue ..	0·20
Beyersfontein ..	0·03	Kubusie ..	0·00
IX. NORTHERN BORDER:		Blancy ..	n.r.
Pella ..	0·00	Kai Road ..	0·63
Kenhardt ..	n.r.	Evelyn Valley ..	n.r.
Van Wyk's Vlei ..	0·00	Bertin ..	0·60
Prieska ..	n.r.	Isidenge ..	n.r.
Dunmurry ..	n.r.	Prie Forest ..	n.r.
Griqua Town ..	0·00	Quacu Forest ..	n.r.
Campbell ..	0·00	Kologha ..	n.r.
Douglas ..	0·00	Fort Jackson ..	0·47
Avoca (Heibert) ..	0·00	Komgha ..	0·43
Esksdale ..	n.r.	Prospect Farm (Div. Komgha)	n.r.
Hopetown ..	0·00	Hopewell Do. ..	n.r.
Orange River ..	n.r.	East London, West ..	0·90
Newlands (Div. Barkly West)	0·15	Do. East ..	0·89
Groot Doetsap ..	n.r.	Fort Cunynghame ..	n.r.
Kimberley (Gaal) ..	0·06	Katberg Sanatorium ..	n.r.
Do. (Stephens) ..	0·03	Guylerville ..	n.r.
Bellsbank (Div. Barkly West)	n.r.	Boto ..	0·33
Grootdrink ..	n.r.	Fort Fordyce ..	n.r.
Barkly West ..	0·12	Daggaboer's Nek ..	0·08
Uppington ..	0·00	Lynedoch ..	0·47
Trooitapspan ..	n.r.	Fountain Head ..	0·17
Now Year's Kraal ..	0·00	Forcstbourne ..	1·31
		Onsellhurst ..	0·80
X. SOUTH-EAST:		XI. NORTH-EAST:	
Melrose ..	0·06	Venterstad ..	0·21
Varken's Kuil (Div. Bedford)	n.r.	Ellesmere ..	0·12
Fairholt ..	0·37	Burnley, Cyphergat ..	n.r.
Cheviot Fells (Bedford) ..	n.r.	Lurgersdorp ..	0·26
Alicedale ..	n.r.	Do. (Le Roex) ..	n.r.
Bedford (Gaal) ..	0·80	Molteno Station ..	n.r.
Do. (Hall) ..	n.r.	Cyphergat ..	0·40
Sydney's Hope ..	0·89	Thibet Park ..	0·18
Cullendale ..	0·56	Sterkstroom ..	0·53
Adelaide ..	0·38	Do. (Giddy) ..	n.r.
Atherstone ..	1·04	Rocklands ..	0·10
Alexandria ..	1·51		

XI. NORTH-EAST— <i>continued.</i>		INCHES.	XII. KAFFRARIA— <i>continued.</i>		INCHES
Aliwal North (Gaol)	..	0·19	Umtata	..	0·37
Do. (Brown)	..	0·25	Qumbu	..	n.r.
Rietfontein	..	0·23	Kokstad	..	0·10
Buffelsfontein	..	n.r.	Port St. John's	..	1·26
Hex's Plantation	..	n.r.	Umzimkulu	..	0·06
Carnarvon Farm	..	0·49	Woodcliff	..	n.r.
Jamestown	..	0·55	Tabankulu	..	0·02
Queenstown (Gaol)	..	0·26	Kilrush	..	0·19
Do. (Beswick)	..	1·05	Somerville (Div. Tsolo)	..	n.r.
Dordrecht	..	n.r.	Tsomo	..	0·42
Tylden	..	0·25	Bazeya	..	0·64
Snow Hill	..	n.r.	Quebe	..	0·73
Herschel	..	0·20	Flagstaff	..	0·12
Lady Grey	..	n.r.	Insikeni	..	0·31
Bolotwa (Contest)	..	0·28			
Lady Frere	..	0·40	XIII. BASUTOLAND :		
Avoca (Div. Barkly East)	..	n.r.	Mafeteng	..	0·68
Keilands	..	0·37	Mohalie's Hoek	..	n.r.
Barkly East	..	0·31	Qacha's Nek	..	0·06
Glenlyon	..	n.r.	Moyeni Quthing	..	0·26
Gateshead	..	n.r.	Teyateyanang	..	0·66
Lyndene	..	n.r.	Leribe	..	n.r.
Mooifontein	..	0·35	Butha Buthe	..	n.r.
Poplar Grove	..	0·00	Maseru	..	n.r.
Biesjesfontein	..	n.r.			
Whittlesea	..	n.r.	XIV. ORANGE RIVER COLONY :		
Middlecourt	..	0·43	Bethulie	..	n.r.
Doornkop	..	0·36	Kroonstad	..	n.r.
Blikana	..	0·29			
XV. KAFFRARIA :			XV. NATAL :		
Slate, Xalanga	..	n.r.	Durban, Observatory	..	0·27
Ida, Xalanga	..	n.r.			
Cala, Xalanga	..	n.r.	XVI. TRANSVAAL :		
Cofimvaba	..	n.r.	Johannesburg	..	n.r.
Nqamakwe	..	0·31	Do. Cemetery	..	n.r.
Main	..	n.r.			
Engcobo	..	n.r.	XVII. BECHUANALAND :		
Butterworth	..	n.r.	Vryburg	..	0·24
Kentani	..	0·21	Taungs	..	0·15
Maclear	..	n.r.			
Idutywa	..	0·15	XVIII. RHODESIA :		
Willowvale	..	0·34	Salisbury	..	0·00
Mount Fletcher	..	0·00	Hope Fountain	..	0·00
Elliotdale	..	n.r.	Geelong	..	0·00
Mqanduli	..	n.r.			
Matatiele	..	n.r.			

CURRENT MARKET RATES OF AGRICULTURAL PRODUCE.

The following Table of Current Market Rates (Wholesale) of Agricultural Produce on Saturday, 23rd August, 1902, ruling at the several centres named, is published for general information.

CENTRE.	A Wheat per 100 lb.	B. Wheat Flour per 100 lb.	C. Boer Meal per 100 lb.	D. Mealies. Meal per 100 lb.	E. Mealie Meal per 100 lb.	F. Barley per 100 lb.	G. Oats, per 100 lb.	H. Oat-hay per 100 lb.	J. Potatoes, per bag	K. Tobacco (Boer Roll) per lb.	L. Beef per lb.	M. Mutton per lb.	N. Fresh Butter per lb.	O. Eggs per doz.	P. Cattle (Slaugh- ter) £ s. d.	Q. Sheep (Slaugh- ter) £ s. d.
Allwal North	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Beaufort West	0 13 6	0 18 0	0 13 0	0 14 0	...	0 11 0	0 15 0	0 17 0	0 14 0	0 0 9	0 0 10	0 0 8	0 2 0	0 2 6	18 10 0	1 2 0
Burgersdorp	0 12 6	...	0 13 6	0 13 6	...	0 10 0	...	...	0 13 6	0 2 3	...	0 0 9	0 2 0	0 2 0	...	...
Cape Town	0 10 6	0 12 6	0 11 0	0 8 3	0 9 6	0 9 0	0 11 0	0 10 0	0 17 6	0 2 0	0 0 8	0 0 7	0 1 5	0 2 3	...	...
Clanwilliam	1 0 0	...	1 1 0	0 15 0	...	...	...	...	...	0 2 0	0 0 8	0 0 7	0 1 9	0 1 9	15 0 0	20/- to 25/-
Colesberg	0 10 0	...	...	0 9 0	...	...	...	...	0 16 6	...	...	...	0 2 9	0 1 6	...	...
Craddock	...	...	...	...	...	0 17 0	...	0 12 6	0 15 0	...	0 0 9	0 0 9	0 2 0	0 2 0	...	...
Dordrecht	...	...	...	...	...	...	...	...	...	...	0 0 11	0 11	0 3 6	0 2 9	...	...
East London	0 11 6	0 17 6	0 17 6	0 12 9	0 10 0	0 15 6	0 18 6	0 12 6	1 9 0	0 1 6	0 1 0	0 1 0	0 3 0	0 1 9	20 0 0	...
Graaff-Reinet	0 12 3	...	0 13 6	0 12 6	...	0 10 3	0 9 9	...	0 15 0	0 0 4	0 0 7	0 0 7	0 2 4	0 2 0	£12 10 to £16	21/- to 22/-
Graham's Town	...	...	...	0 12 6	...	0 10 0	...	0 10 0	0 17 0	0 1 4	0 0 9	0 0 9	0 2 4	0 2 3	...	...
Kimberley	0 13 0	0 17 0	0 12 6	0 13 0	0 12 6	0 12 0	0 13 6	0 13 6	1 5 0	0 1 0	0 1 2	0 0 10	0 2 3	0 2 6	£14 to £20	20/- to 25/-
King Wm's Town	0 12 6	0 16 3	0 13 9	0 10 6	0 11 0	0 11 6	0 13 0	0 9 6	0 13 0	0 1 0	0 0 7	0 0 9	0 2 3	0 1 9	£18 1/- to £27 1/-	23 6 to 29 7
Malmesbury	0 10 0	0 13 0	0 12 0	0 10 0	...	0 10 0	0 12 6	0 10 0	1 0 0	0 1 3	0 0 8	0 0 8	0 1 9	0 2 0	16 10 0	1 5 0

CURRENT RATES OF AGRICULTURAL PRODUCE—(continued).

CENTRE	A. Wheat per 100 lb	B. Wheat Flour per 100 lb.	C. Roe Meal per 100 lb.	D. Malt per 100 lb.	E. Malt per 100 lb.	F. Barley per 100 lb.	G. Oats per 100 lb.	H. Oat hay per 100 lb.	J. Potatoes per bag	K. Tobacco Boer Roll per lb.	L. Beef per lb	M. Mutton per lb	N. Fresh Butter per lb.	O. Eggs per doz	P. Cattle (Slaugh- ter)	Q. Sheep (Slaugh- ter)
Mossel Bay	£ s d 0 12 0	£ s d 0 14 0	£ s d 0 12 0	£ s d 0 9 0	£ s d ...	£ s d 0 7 6	£ s d 0 16 0	£ s d 0 7 6	£ s d 1 5 0	£ s d 2 5 0	£ s d 0 0 0	£ s d 0 0 9	£ s d 0 1 6	£ s d 0 1 6	£ s d ...	£ s d ...
Pietermaritzburg	£ s d ...	£ s d ...	£ s d ...	£ s d ...	£ s d ...	£ s d ...	£ s d ...	£ s d ...	£ s d ...	£ s d ...	£ s d ...	£ s d ...	£ s d ...	£ s d ...	£ s d ...	£ s d ...
Port Alfred	£ s d ...	£ s d ...	£ s d ...	£ s d ...	£ s d ...	£ s d ...	£ s d ...	£ s d ...	£ s d ...	£ s d ...	£ s d ...	£ s d ...	£ s d ...	£ s d ...	£ s d ...	£ s d ...
Port Elizabeth	£ s d 0 11 0	£ s d ...	£ s d ...	£ s d 0 13 0	£ s d ...	£ s d 0 9 6	£ s d ...	£ s d 0 8 0	£ s d 1 1 0	£ s d 0 0 5	£ s d ...	£ s d ...	£ s d 0 2 0	£ s d 0 2 3	£ s d ...	£ s d ...
Queen's Town	£ s d 0 10 6	£ s d 0 12 6	£ s d 0 10 6	£ s d 0 12 6	£ s d 0 13 0	£ s d 0 9 0	£ s d 0 7 0	£ s d 0 7 9	£ s d 0 19 6	£ s d 0 2 0	£ s d 0 0 9	£ s d 0 0 7	£ s d 0 3 0	£ s d 0 1 7	£ s d ...	£ s d ...
Takastad	£ s d 0 10 6	£ s d 1 1 0	£ s d 0 13 0	£ s d 0 13 0	£ s d 0 13 0	£ s d 0 9 0	£ s d ...	£ s d 0 6 0	£ s d 0 10 0	£ s d 0 2 0	£ s d 0 0 10	£ s d 0 0 8	£ s d 0 4 0	£ s d 0 2 6	£ s d ...	£ s d ...
Vryburg	£ s d 0 16 0	£ s d 1 1 6	£ s d 0 13 0	£ s d 0 14 3	£ s d 0 13 6	£ s d ...	£ s d 0 13 6	£ s d 1 1 0	£ s d 1 0 0	£ s d 0 1 7	£ s d 0 0 10	£ s d 0 0 10	£ s d 0 3 0	£ s d 0 2 6	£ s d £16 to £25	£ s d ...
Worcester	£ s d 0 11 0	£ s d 0 13 0	£ s d 0 11 0	£ s d 0 12 0	£ s d 0 11 0	£ s d 0 10 0	£ s d 0 14 0	£ s d 0 6 0	£ s d 1 4 0	£ s d 0 0 9	£ s d 0 0 8	£ s d 0 0 8	£ s d 0 2 0	£ s d 0 1 6	£ s d 14 0 0	£ s d 1 15 0

NOTE.—Returns have not been received from the Civil Commissioners of Alhval North and Port Alfred.

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EDITORIAL NOTES.

Frontier farmers are hoping to secure the services of a professional wool sorter from Australia and are moving to that end. The Farmers Associations are not quite decided whether to ask for a man from Australia or for one from the old country. As it is instruction they desire on the matter of grading and packing wool the produce buyers of East London or Port Elizabeth could possibly provide all they need. A little competitive effort should do the rest.

Cold storage for export fruit at the Capetown Docks has long been a subject of dissatisfaction among fruit-growers. From the information placed before the Board of Horticulture there seems reason to hope that the end of the trouble is in sight.

Fruit-growers have a really serious cause of complaint against the Railway Department. It is, no doubt, a difficult matter to attempt to completely prevent the theft of fruit in transit because it is such an easy matter to break a box and put it down to accident. But it is none the less a hardship for the owner of the fruit to be victimised in this heartless manner season after season. The whole question was fully discussed at the meeting of the Board of Horticulture last month and the publicity given to this really substantial grievance will, we trust, bring about a remedy.

Labour difficulties are not confined to the mining districts of the Transvaal. Coloured labour is as badly needed in the Colony on the farms as in any other part of South Africa. The whole case of the Western Province is shown in the discussion on the subject which took place at the recent meeting of the Board of Horticulture—a full report of which appears on another page. From all sides the complaint arises that development is checked by want of labour. In some cases it is difficult even to carry on the ordinary work. Many suggestions were offered at that meeting, the two most notable being those favouring a scheme of immigration either of Coolies or Italians. It should be quite unnecessary to repeat the many difficulties in the way of carrying out either suggestion so as to assure a completely satisfactory result, for they are generally recognised. The urgency of the need however may compel the facing of the trouble, difficulties and all. The real danger of importing white labour is that within a few months of its introduction other occupations of a more attractive nature claim the labourers and the importer is, “as you were.”

As to Coolie labour the experience of Natal is not altogether encouraging. Even with the most drastic regulations compelling him to return at the close of his indentures it will be found in practice that once Ram-Sammy gets his foot in, there he remains; for no matter how much the European objects to his proximity he, at least, always knows when he is well off. The prospect of the Western Districts of the Cape being dotted over with coolie locations, and all the small cultivation and minor trading of the country falling into the hands of an insanitary community of low-caste Hindoos, as is the case of the coast districts of Natal, is far from attractive. The coolie will get here quite soon enough without our taking the trouble to import him. And when he arrives in any numbers we shall soon be at our wits ends to know what to do with him. It looks so easy to import Coolie labour but it involves so many other considerations

that it would have been wiser to have hesitated before deciding to urge such a course upon the Government.

It has to be remembered that the abnormal conditions arising out of the war have not yet entirely ceased. Natives have been largely employed by the military at high rates of pay and a goodly proportion of that money is still unexpended. When the surplus is worked off, native labour should be available once more in fairly sufficient quantities particularly for the farmer; for very few of the Colonial Kafirs, for instance, can be induced to work underground in the mines. The Kafir, properly handled, is the best labourer for this country. He will do his work and go back to the Territories to spend the balance of his savings in cattle and wives. He, therefore, meets the whole requirements of the case better than any other possible competitor. All that is needed to meet the demands of the farmers is a well organised bureau to gather the labour in the Native Territories, forward it to the west, and see to its proper distribution. As the labour question is so acute it would surely pay the farmers to make some organised effort in their own interest. To make the movement a success it would be necessary to fix a uniform rate of wage and provide comfortable quarters for the natives away from liquor and other temptations. A scheme drafted on this basis might first be tried before wilfully adding to the complications of race in the country by importing Coolies or Japanese, or even German or Italian labour. There is plenty of labour in South Africa. The trouble is to get it to the work most needed at the time.

Farmers Associations are beginning to show signs of reawakening all over the country and it is to be hoped that we shall soon see most of them in full swing once more. At Beaufort West the first meeting since September 1900 was held on the 2nd ult. Several questions cropped up, but the most important from the farmer's stand-point was a delivery by Mr. J. R. Jackson on the Scab Act. He holds that we are no further forward than we were ten years ago, the present Act being an entire failure, having resulted in merely waste of money, the sheep in many parts of the Colony being in a worse state than was the case ten years back. The only good the Act had probably done was that it had taught many farmers to dip their flocks, but it was not by any means the Act required to eradicate scab. By the way, purely party politics are *tabu* by the B.W.F.A., in the future. A wise decision which should increase the membership.

To most of this we are compelled to respond in the affirmative. So far as the actual condition of the sheep of the Colony is concerned we believe that, if not worse than ten years ago, it is certainly no better. And it is common cause among all sheepmen

that the present Act cannot be expected to eradicate scab. There are those who still maintain that scab cannot be eradicated, but they may be left out of consideration. Admitting the weaknesses of existing legislation, the abnormal conditions of the country during the past three years must not be overlooked. With the most perfect machinery, active hostilities would be bound to cause some dislocation. While hoping for better things in the future it is gratifying to learn that many farmers are being taught to dip their flocks by means of the existing law. If we can get one to dip where none dipped before it is something gained and each dipper is a step towards the universal cleanliness we hope for in the future.

The North Western Districts having been pretty well depleted of grain owing to the disturbed conditions brought about by war and rebellion the Government has forwarded some 1250 bags of seed wheat to be distributed among the farmers there, largely amongst the Mission Stations in Great Namaqualand. Unfortunately owing to delays caused by swollen rivers and the flooded state of the lower part of the country the wheat was rather late in getting to Calvinia, Clanwilliam and Van Rhynsdorp. In Clanwilliam, however they had late rains which brought down the Doorn River and it is believed that the farmers may yet succeed in securing fairly good late crops. Any people in these districts requiring grain for food should apply to the magistrates.

The Darby Land Digger is mentioned in another part of this issue and a fairly full description given. An esteemed correspondent writing from the Eastern Province on the subject of this implement says "it ought, if all that is claimed for it be correct, to suit such wheat growing districts as Wodehouse and the Conquered territory in the O.R.C. It is stated that it cultivates an acre an hour but if the width of the implement is given correctly it should do the work of seven double furrow ploughs, or say from 21 to 24 acres in an day of eight hours. Even if the implement is only 7ft. 6in., wide (which seems the more probable) travelling at the rate of two miles an hour—the ordinary pace of draught oxen in the plough—it would do an acre and three-quarters an hour. Two miles equalling 3520 yards multiplied by $2\frac{1}{2}$ yds. giving 8,800 square yards. Rinderpest, war, redwater, lung sickness and other causes have reduced the number of draught animals to such an extent that steam cultivation will have to come where there are large fields to till."

Ticks have become a terrible scourge to every kind of farming stock raised in South Africa. Scarcely a single domesticated animal can be truly said to be free of them entirely, while in parts of the country they are blamed as the originating cause of the heaviest

losses pastoralists are called upon to bear. Any suggestion, therefore, which promises to relieve our staple rural industries of this peculiar form of blood tax must necessarily command the attention of the country. In this issue we reproduce for the benefit of all concerned some lengthy extracts from the annual report of the Government Entomologist, giving in interesting and striking detail the series of experiments, conducted by that officer, which point so conclusively to the fatal part played by the Bont Tick in the transmission of the disease known as heartwater in sheep and goats.

It is only when the terrible ravages of this disease are carefully considered that anything approaching a full conception of the value of this report can be arrived at. For Mr. Lounsbury does not confine himself to the bare scientific demonstration of the connection between the Bont Tick and the dissemination of the disease, though this in itself is work of great value. By his careful investigations into the life cycle of the particular species that transmits this disease, he is in a position to suggest what appears, on the face of it, to be a fairly feasible scheme for preventing the further spread of the disease, and of ultimately winning back the thousands of acres which have been rendered valueless for small stock entirely owing to the prevalence of this scourge.

The reclamation scheme, if we may so describe the plan put forward by the Government Entomologist, is one that has been tried successfully in the United States in combatting Redwater in cattle, a disease disseminated in the same manner as heartwater in sheep and goats. As a practical measure therefore it has passed out of the experimental stage. The general desire of the stock owner is usually to find a cure for diseases, but Mr. Lounsbury does not pretend to meet this. His proposal is to get rid of the disease by exterminating the medium that carries it. A certain cure or preventive in the shape of inoculation would, doubtless, be more heartily welcomed, but failing that, the suggestions now put forward are worthy of trial.

To begin with the scheme is based on the soundest of deductions, the outcome of most exhaustive experiments. The facts established by Mr. Lounsbury as to the life history of the Bont Tick, make it as certain as such conclusions can be made certain, that by excluding cattle and horses, and even game if possible, from infected veld, the Bont Tick would in the course of time be starved out, and the disease checked, if not eradicated entirely. The *modus* suggested is to encourage farmers and others in heartwater areas to destroy the Bont Tick wherever it is found; and to make sure of a successful issue, to get the control of notoriously bad heartwater veld, fence it in sections, keep all stock off it for a period of from twelve to twenty-four months, and then re-stock it by degrees. This scheme of starving out the tick has been largely successful in the United States in dealing with redwater and, though in this country the

difficulties may appear insurmountable, and the expense very nearly prohibitive, we believe that co-operation would overcome the former and the latter would soon be recouped, if the experiments on the larger scale were as successful as the investigations promise.

The question of expense is the first stumbling block. But one glance at the sketch map showing the heartwater area of the Colony convinces one that even a heavy initial outlay is justifiable, provided there are reasonable hopes of success. Heartwater has ruined sheep breeding in many districts altogether, and made it a more or less precarious industry in others where magnificent flocks at one time prospered. These districts include Uitenhage, Jansenville, part of Somerset East, Albany, Alexandria, Bathurst, Peddie, King William's Town, Komghe, Stutterheim and others. And year by year the scourge seems to gain a stronger hold. Now, if it were possible to suppress the disease in all these districts, that part of the country would be rehabilitated, and again become the great meat and wool producer of South Africa. Some approximate figures collated from Blue Books are given by Mr. Lounsbury showing the falling off in the stock wealth of those districts after the advent of heartwater. For instance the district of Albany in 1865 possessed 309,500 sheep which in 1895 had fallen to 148,000 and in 1890 the total was 76,000. Of Angora goats in 1875 the same district carried no less than 31,500. In 1899 the number was 5,300. The sheep of Alexandria in 1865 numbered 41,000, in 1899 they were 4,000. In Bathurst in 1865 there were 18,750 sheep, and in 1899 there were 285. In Peddie the total was reduced from 54,000 to 19,000 in the same period. King William's Town district with its rolling grass veld, in 1875 carried 464,000 sheep, In 1899 the number was reduced to 188,000. Uitenhage fell from 343,000 in 1865 to 24,000 in 1899. There were, no doubt, other contributory causes which helped to bring about the ruinous depletion of the flocks of the districts mentioned, but heartwater may be fairly accepted as the main factor.

This is only a portion of the debit side of the question, but it should be sufficient to cause flock masters in every part of the Colony, and every one interested in the industrial future of South Africa to realise how damaging this scourge has proven in times past. It is still with us and spreading from month to month, for there is no indication of it becoming confined to any particular area. Like redwater it travels—spasmodically perhaps, but none the less surely. And now that a feasible scheme has been devised which promises relief, it rests largely with the farmers themselves to see that some practical steps are taken to secure the benefits of the scientific investigations.

What makes this matter of greater importance is the fact that it involves the question of the eradication, or at least the possible minimising, of redwater as well. For once it was established that

paddocked and protected lands would starve out the ticks, an extension of the system would go a great way towards helping to keep down redwater in cattle. This is being done in the United States where the people are waging war against the sempiternal tick, and are thus securing clean pastures which they are careful to keep strictly apart from the infected areas. This policy of tick destruction should go hand in hand with that of enclosing lands for the purpose of starving out these mischievous parasites.

This stage brings us to another very valuable contribution in this issue from the facile pen of Mr. Lounsbury, namely the illustrated article on destroying ticks by spraying with paraffin and water. The satisfactory results obtained by the Hon. A. Douglass, M.L.A., and his son at the Fish River Rand, as well as by other stock farmers in other districts, are distinctly encouraging. They demonstrate the consolatory fact that it pays the farmer to march in the van of progress. This question of tick destruction is no new topic to cattle farmers. It is one that has been receiving their earnest attention for years past, but it has never been classed as a vital necessity until, comparatively speaking, quite recently. The mischief worked by ticks on cattle and small stock was apparent to the most casual observer; the main trouble was how to devise a means of getting rid of them without injury to the stock for they have frequently figured as impervious to any known remedy. But close study and a persistent determination have brought us to the present phase of the question where, it would appear, we seem to have within reach practicable methods of attacking and suppressing, if not entirely eradicating, these irritating pests. As this issue contains so much interesting matter on this vital subject, we should be pleased to hear from the stock farmers of the districts concerned, some record of their experiences with this particular obstacle to stock-breeding and dairying in South Africa.

There remains, of course, in the case of redwater, the alternative of dipping. This method has been adopted with signal success in Queensland and is being tried in Rhodesia. The only question at issue would appear to be that of cost. We hope to be in a position shortly to discuss this alternative method with full data, when the two schemes can be compared financially.

Mr. W. Robertson, M.R.C.V.S., of the Government Veterinary Department, contributes to this issue an exceedingly interesting article on "Rabies or Hydrophobia." This disease has, unfortunately broken out in Rhodesia, having been introduced from the northern territories through Barotseland, and owing to the imminent danger of it being carried further south the Government has issued a proclamation prohibiting the introduction of all dogs and other

carnivora and monkeys from Southern Rhodesia or the Bechuanaland Protectorate. No one can question the necessity for this precautionary measure, for the disease has peculiar terrors for the human as well as the canine creature. It would be folly to anticipate any serious result provided the prohibition is strictly maintained, but as it is quite possible that the disease may break through the cordon in spite of all precautions—it would be as well if people prepared themselves for the more drastic measures in case of such an unfortunate eventuality later on.

Mr. Robertson makes it very clear that the experience of nearly the whole civilised world shows that this disease can be kept under control by muzzling. Such an order would probably be resented at the present juncture and would be difficult to carry out because of the large numbers of stray dogs in the Native Territories and wandering all over the country in the less populous districts. Rabies, however, is no respecter of persons, canine or human, and should it threaten to invade the Colony, a general muzzling order should be welcomed by the people—the farmers in particular—and from the date of its issue all stray unmuzzled dogs should be destroyed. Jackals, wolves, hyenas and monkeys of all kinds—including the baboon, may carry the virus, so the field of possible infection is very wide indeed. The saliva of the affected animal contains the poison and the method of infection is through the bite. It naturally follows that the one and only sure preventive is muzzling.

The Chartered Company has arranged for the establishment of a branch of the famous Pasteur Institute for the treatment of possible cases of the disease and an experienced practitioner of the Pasteur system will arrive within a few days. In view of these facts the details given by Mr. Robertson—himself a Pasteur student—of the method of treatment adopted will be read with added zest. Of course such a system is bound to meet with much scepticism, but there can be no doubt as to one of the outstanding facts—no other system of preventive or curative inoculation exists. It is claimed that the Pasteur methods have reduced the mortality in rabies from 10 per cent. to 1.2 per cent. a really wonderful achievement when the whole facts of the case are fully considered. The disease is so uncertain, and its incubative period so variable that accurate statistics are difficult to obtain. But the main features stand out prominently. Rabies threatens the whole country and every care must be taken to prevent it spreading. Therefore all attention should be concentrated on the preventive means obtainable.

Natal has taken the precaution of prohibiting the importation of all dogs into that Colony by sea or land, from all parts of the world, with the exception of Great Britain and Australasia. But even

when imported from either of these two countries they must be accompanied by the certificate of a Veterinary Surgeon that the animals come from a place where Rabies did not exist and were, at the time of leaving the port or place of their departure free from Rabies or infectious disease and in sound health. In addition to this, strict quarantine for three months is insisted upon, the owner being required to enter into a bond to that effect. At the expiration of the period mentioned, the District Veterinary Surgeon at the Port is to report on the condition of the dog. A fine of £50 is the punishment for contravention of these conditions.

In the House of Assembly on the 16th ult., Mr. J. A. Smuts asked the Hon. the Secretary for Agriculture what has been done with the sum of money placed on the Estimates in 1900 for free dip in terms of the Scab Act; and why, since the commencement of 1901 no dip has, on application, been supplied free by the Government? Mr. Frost said that the sum of £29,300 was provided on the Estimates for the simultaneous dipping which should have taken place last year. Of this amount £21,762 12s. 6d. was spent on sheep dipping ingredients. The simultaneous dipping provided for during 1901 was rendered impracticable owing to the unsettled state of portions of the Colony, and the provisions of sections 14, 15, 16, 18, and 19 of the Scab Act, No. 28, of 1889, were accordingly suspended as notified by Government notice No. 918 of 1900. A large quantity of the dip purchased had been sold, and the remainder had been stored at the Government depots for sale at cost price to the farmers.

The contribution in this issue on the making of sheep's milk cheese, a rural industry of some local importance in Italy and other parts of the south of Europe, opens up a tempting vista of possibilities for South Africa. But this industry, it is to be feared, is more likely to add to the rapidly extending catalogue of what might be done in this country in the shape of agricultural enterprise than to form, at least for many years to come, anything approaching a stable industry among our people. The interesting essay must however, prove instructive and may lead to some effort to follow suit allowing for the modifications of climate and the different classes of sheep being dealt with. It has to be recognised, however, that it is not an easy task to graft the smaller rural industries of the European peasantry upon a people situated as are the bulk of South African cultivators. Apart from differing climatic and other conditions the social question must be considered and compared. If we had a large population of peasant proprietors the lesser agricultural industries would establish themselves without any forcing, for such a class would be compelled by their circumstances to turn their attention to such matters filling the spare time of the women and children and

adding to the earning capacity of each family. But we have not such a population as yet, and our equivalent for the peasant class of Europe prefers to make its living by other means than those adopted in the older countries. For not only is it necessary for the prosecution of these smaller industries that they should be handled by a peasantry but the peasantry should be fixed on the land. This, unfortunately, is not the case in any part of South Africa, and though time may work wonders in this direction, it still looks a long way off. Even in Australia and New Zealand the small cultivator finds it difficult to establish himself against the large holders and the squatters, while in South Africa the native question adds complexity to an already complicated subject. For the information of those who may wish to follow this matter further we may add that our correspondent who is travelling in Europe has forwarded a sample of the *presura* mentioned and a *cacine*.

Speaking at a meeting of farmers and merchants at Dordrecht in the early days of September Mr. Hutcheon, C.V.S., appealed against the misunderstanding which existed with regard to the Government regulations for the suppression of Rinderpest. He said it is absolutely necessary to pass extreme measures and compel each farmer to inoculate and isolate his stock until all vestige of infection had ceased. In other words the whole district would have to be quarantined. He deprecated the outcry for bile stations which would only mean a great outlay of public money and public convenience which is quite unnecessary. Inoculating with pure bile is forbidden by the Government, and serum is now recommended in larger doses than has been administered up to the present. With good serum given in sufficient doses, and the isolation of cattle until infection is impossible, a very small percentage of loss occurs and the prevention of the disease assured. Serum can now be supplied at 10s. per bottle instead of 20s. Such a re-assuring statement coming from so reliable a source should calm the fears of the people. The disease can be controlled if ordinary precautions are taken, but only by co-operation on sound lines, and confidence in the Veterinary Officers.

As a result of this statement the meeting passed a resolution unanimously—on the motion of Mr. J. V. O'Brien seconded by Mr. W. J. Hogsett—reading as follows:—"That this meeting having heard the views expressed by Dr. Hutcheon, Chief Veterinary Surgeon as to the desirability of proclaiming the Wodehouse District an infected area for Rinderpest purposes, heartily approves of his suggestions, and would strongly urge upon Government the necessity of placing mules &c., at the use of residents in these parts for transport traffic. "This means that practically the Wodehouse people are realising the value of the precautions—though they are drastic

—and may be expected shortly in common with other districts affected, to offer thanks for that which they were at first inclined to regard as a hardship. A full justification for the action taken by the Government is to be found in the September issue of the *Agricultural Journal*.

The Frontier Acclimatisation Society has had a splendid spawning season. The Trout Hatcheries at the Pirie Forest has developed no less than 162,000 fry, and most of them were ready for liberation during last month. This Society has forwarded 5,000 Rainbow ova to Jonker's Hoek, the curator there wishing for a new strain. The opening of the Keiskamma, Buffalo, Kubusie and Izeli rivers for fly fishing is under consideration.

While thanking Mr. Goulden—and many others who have kindly noticed the changes—for his appreciative remarks upon the improved form and character of the *Journal* his other criticisms cannot be passed over in complete silence. We feel inclined to ask him—is he not tilting at a windmill? He has had sufficient experience as an orchardist to know that all advice offered on such a question as pruning is subject to local conditions and personal experience. We would ask him further which course he would think wisest to adopt in penning a note that is meant for general consumption? Would he take up an uncompromising attitude of didactic precision giving detailed instructions and exact measurements or would he not rather favour a general instruction with a warning not to overdo the operation. Knowing Mr. Goulden we believe he would adopt the latter course, but even had we no personal knowledge of that gentleman we should read that intention into his letter. Perused with care, and in its entirety, even Mr. Goulden can read no more into the paragraph he quarrels with in the August issue.

As we have no desire to accuse Mr. Goulden of that “sheer cussedness” mentioned in the same paragraph, we thank him for the frank expression of the results of his own personal experience. As he so justly remarks it is the ounce of practice that counts—theory is very often largely a waste product. Mr. Goulden's experiences are interesting, and as they show a strong vein of character they may prove useful to other orchardists. Anyhow we are glad to receive and publish them, and trust that others may follow suit and forward the results of their practical work in this and similar directions.

“A.W.” whose letter appears in the correspondence this month is inclined to impatience, we fear. Anyone who knows this country at all is never impatient with the impatience of the farmer, but it doesn't

do to encourage it. "A.W." is also inclined to verbal extravagance and to a consequent tendency to unreasonableness. While sympathising with much that he writes, it is impossible to allow all his statements to pass unchallenged. In the first place simultaneous dipping in some form or the other is necessary in the interests of the country, otherwise you never get a fair start. And while admitting a certain amount of hardship caused by the war conditions acting against the working of the present law the sums quoted by "A.W." as to the cost of dipping are serious exaggerations. The actual cost of dipping sheep averages between 3s. 6d. and 5s. per 100. Does "A.W." know any flockmaster with 20,000 sheep in this Colony? Were the policy favoured by the Department adopted, and the country divided into blocks or areas for the purposes of the Act, less trouble would ensue, but that proposition has not so far been approved.

The next question raised by "A.W." is the provision of netting to keep jackals from young stock. The essentially practical attitude of the writer on his farm is invaluable. But the contrast is remarkable when he theorises on paper. He demonstrates the fact that it is an excellent commercial investment, yet in the same breath asks Government to subsidise farmers to adopt it generally. If it were a question of a struggling industry there would be some justification for the demand. But as it is, we can only compare it with a request from the general community for a special subsidy to encourage them to save their money instead of wasting it.

As to Ticks and the part they play in the transmission of disease in stock we cherish the belief that even "A.W." will be satisfied, after reading the present issue, that this subject and that of Tick eradication is receiving full attention at the hands of the Department. We hope to give the fullest information as to Redwater in Rhodesia in the next issue, when more will be heard about the ever-present and destructive Tick. But in these matters we have to make haste slowly.

FARM AND VELD.

SEASONABLE NOTES.

The heavy rains of August and September have secured an excellent water supply for the Eastern districts for many months to come. Considerable quantities of kafir corn and early mealies have been sown in those districts, and the season, according to an East London correspondent, appears to be a promising one for all cereals.

In the North-Eastern districts the season was so dry in August that many of the cattle farmers drove their stock over the Orange River into the Orange River Colony where the grazing was very much better than south of the river.

Farmers in the Albert District are taking to dairying as an industry with more frequency. The separator is coming into fashion and the services of the Dairy Expert have been requisitioned there lately to instruct the farmers in the use of that invaluable adjunct to the dairy.

From Griqualand East we learn that the early spring rains have improved the prospects there wonderfully, and the season is opening full of promise. It is expected that dairying on a large scale will occupy the attention of the cattle breeders of that district before very long. Butter and cheese ought to become a staple and remunerative industry all through that excellent country. All that is needed is organisation and co-operation on sound business lines to make the venture successful.

It will be unwelcome news for farmers that Mr. Berg, Klipfontein Malmesbury, has noticed an attack of rust on Algerian oats, the seed of which was grown last year on his own farm from imported seed. The fact is unquestionable and it only remains to watch the development of the disease, to discover to what extent the crop will be damaged. This dashes to the ground the hope so frequently expressed that a rust-proof variety of oats had been discovered.

Since the beginning of September fruit trees have been in flower in the Western Districts. Apricot and Peach trees made the start and were closely followed by Japanese plums—particularly the Kelsey—and early flowering pears like the Keiffer Hybrid. The show of bloom is good, probably in excess of other years and if all goes well a heavy crop may be expected.

From Wellington it is reported that the Blenheim apricot has again caused disappointment in consequence of trees dropping their buds in the same way as has been observed in past years in regard to certain varieties of peaches. It is understood that growers seriously think of discarding that variety altogether and of changing existing plantations by re-budding. The Royal apricot, on the other hand, has again proved a great success and gains greatly in favour, but is not recommended for Mebos in which case the old local varieties are preferred.

Prunes, unfortunately, are looked upon with suspicion as they have so far not done well in that part and some farmers are taking up plantations of many years to make room for vines.

The storm on the 10th and 11th of September did a fair amount of damage all round and uprooted in various parts large Eucalyptus and Fir trees. But not very much damage ensued in respect to fruit trees as the fruit had not yet set.

The abnormal weather experienced so far seriously interfered with the progress of farm work. Whilst the copious rains were rather favourable to cereal crops, they have handicapped vines and fruit-growers to such an extent that in many cases the tillage work in orchards and vineyards looks considerably behind, and in others farmers are quite unable to plant out their trees and vines on account of the soil being so excessively wet. These difficulties are enhanced by a remarkable scarcity of labour. The labour question is assuming a serious aspect as farmers are forced to limit their operations, being unable to obtain the hands they require.

Stock keeps in good condition in the Western Province and milk cows are in great demand, fetching at an average about £20 a piece irrespective of breed as long as they are in good condition. All these cows go up-country, mostly to Johannesburg and there is every reason to fear that this wholesale export will make itself felt down here very soon.

In the Stellenbosch division two poultry farms are being started and farmers are keenly watching these enterprises as they can hardly conceive how poultry farming alone can be made to pay.

Vineyards are now budding fast and show a most satisfactory number of bunches so that a good and plentiful vintage may be expected if the weather favours flowering.

Vine farmers who have already planted their newly-grafted vines into the nursery are advised to pay attention to re-covering their grafts where the soil has been washed away, as exposure will dry up the scions.

"The season for sowing the two pasture grasses the one known locally as Rhodes's Grass (*Ohloris gayana*), and *Paspalum dilatatum* is now with us," writes a correspondent. "Rhodes's grass does well if sown in September. It may be sown either broadcast, or in a nursery and the roots planted out afterwards. Sown in September on the slopes of Table Mountain I have seen the ground thickly covered with this vigorous growing grass three months afterwards. Sown later on dry ground on the Cape Flats I have seen it entirely fail. Both Rhodes's grass and *Paspalum dilatatum* are summer growers. In parts of the Colony where the summer is very dry, they can only be expected to yield a good return of fodder when either watered or in a locality where there is subsoil moisture. Thus though Rhodes's grass may fail on dry ground on the Cape Flats, it will succeed on vlei ground." Rhodes's grass, as our correspondent calls it, has done very well indeed on many parts of the Cape Flats.

It is said that a large part of the butter we are now importing from Australia is produced on *Paspalum* grass. Mr. Valder the Government Agent of New South Wales who is now in Cape Town gives accounts of the success of this grass for dairying purposes in the northern districts of New South Wales, where there is a heavy summer rainfall. It also does well in the southern districts of New South Wales where the rain comes in winter chiefly. There is some trouble in starting it in the southern districts of New South Wales, however, unless it is raised in a nursery where it can be regularly watered. The accounts of *Paspalum* grass are equally good from Algeria and from California. In both these places it has been grown with success for some years past, and in favourable localities has yielded enormous weights of fodder per acre.

It has been brought to the notice of the Department that this year many of the oat crops are shewing quite a quantity of wild mustard, known to the farmers as *rammenas*. This is a serious matter for in many countries this plant has become a great pest and interfered considerably with the growth of grain crops. It would therefore be a great pity if it were allowed to establish itself here and spread throughout the Colony. It is highly necessary that all farmers should be warned of the desirability of keeping down this noxious weed. All fields showing any trace of the plant should be cleared by hand-picking *before seeding*; and as there can be no doubt but that its introduction is due to the importation of Algerian oats, care should be taken to purchase only clean seed. The seed very much resembles that of the turnip so that no difficulty should be experienced in its recognition. Merchants might also help in this matter by insisting that all seed oats imported by them should be free from this noxious weed.

Mange or Brandzichte has spread among horses in the Colony to an enormous extent recently. For some time past the disease was noticed among large numbers of the military horses on service, and was particularly prevalent among the cast and debilitated animals. As there can be no doubt whatever that the disease is caused by the *acarus*, and is thus liable to spread from animal to animal very rapidly, the attention of all horse owners is directed to page 360 of this issue on which appears a reprint of an article on the subject from the pen of the Colonial Veterinary Surgeon. The great thing in the treatment of all parasitic diseases is care and attention. Whichever of the remedies is applied, the treatment must be thorough, otherwise the eggs of the parasite escape and the work has to be done all over again within a very short period. Mange in horses is not a fatal disease but affects the working condition and value of the animal very considerably and, in addition, gives him in the worst forms, a very unsightly appearance.

Importations of blood stock are again occupying the attention of the more wide-awake farmer who can see the prospect of the immediate future. Among these we must class Col. W. J. Warren, M.L.A., who while on a visit to England recently entered into negotiations with Messrs. Dean & Sons, of Lincolnshire for the purchase of some of their pure-blooded Shorthorns. Two cows, one young bull and a heifer arrived by the s.s. *Hylas* in excellent condition and have been forwarded to Cloverdale, near Stutterheim, the farm purchased by Col. Warren, from the estate of his deceased brother. These animals are all of the world-renowned Bates strain, the cows being both in calf, having been served before leaving England. Another shipment of five Shorthorns of the same breed is expected to leave some time this month. It is interesting to note that on arrival at the farm each of these animals is inoculated as a safeguard against redwater, and as every care is taken to keep off ticks Col. Warren has little fear for his valuable importations.

The past month has been remarkable for boisterous weather, but the most disastrous month, from the agricultural point of view, of the particularly severe winter just ended, was June. During that month the Transkeian districts were visited by a perfect blizzard, and the full details of the damage are but now coming to hand. In addition to the enormous losses of stock, most of the forest reserves were practically wrecked. Writing quite recently, the District Forest Officer at Kokstad described the damage all round as considerable, and in some instances, such as the central Bantam and Insikeni Forests, as "almost beyond description." He doubts if a single tree is left undamaged in either of these forest reserves. It is a singular fact that the most sheltered forests have suffered to the greatest extent. It seems that in these forests the weight of the snow

broke off all the branches and left only the bare stumps standing. In forests like the Mokolwana, Elamasimi, (Insikeni) Gungini, Mhlonga (central) Zimankulu (Mpola) and the Etina reserve, the trees in the upper portions were stripped bare, while in the lower parts of the same forests where the wind had full play, and so prevented the accumulation of snow, the damage did not appear considerable though on closer inspection large trees were found blown down.

The following cutting is from the *Live Stock Journal* "Mr. Arthur Forbes has recently purchased from Mr. A. W. Hickling, Adbolton Stud, Nottingham, at a high price, the very promising two-year old Hackney Stallion, Lord Donington, for early shipment to his stud farm, Schoombie, Cape Colony. Lord Donington is a well bred, bright bay, clear of white, and standing on big limbs and the best of feet. He shows great muscular development, beautiful shoulders, perfectly carried head and neck, with any amount of quality and stallion character. His action is brilliant all round, going with tremendous force off his hocks, and using his shoulders in the right way. In the showyard this colt has already earned a distinguished reputation at the Great Yorkshire, Royal Lancashire, and other important shows, in open competition, his record being one champion cup, 11 first and two third prizes.

It is gratifying to be able to report that the boisterous weather of September which worked such havoc along the coast and flooded many of the lower districts has brought relief to the drought-stricken uplands of the north-east and north-west. The season having opened so favourably in the stock-rearing districts we may look forward to conditions that may be expected to make some recompense for the losses of the past. Cattle should thrive apace and the flockmasters' eyes be gladdened by the promise of spring. The abnormality of the present season is remarkable in every sense. It is not often that the South African farmer can contemplate a good season with the assurance of good markets as well.

It is the dry seasons that find the weak spots in the sheepman's armour. During the past few months when flocks have had to be kept on the "trek" to keep them alive, the losses have been very great. And, unfortunately, owing to the condition of the country it has not been found possible to enforce the scab regulations so effectually as was desired. The result has been a general tendency towards a set-back but now that the country is settling down again all the leeway should be soon made up. The value of dipping is forcing itself upon even the most backward, and the day is not far off when cleanliness will be the rule and not the exception. A few good seasons will make all the difference.

"Hand-dressing" or "Spot-dressing" for Scab is sometimes advocated under the impression, that dipping will deteriorate the condition of the sheep, and that they would be less able to contend against the severity of drought. A greater mistake could not be made, for there is no better method for propagating scab than by spot-dressing. Sheep are herded closely together in an infected kraal (which in itself is a very hotbed of disease)—scabby animals are brought into contact with the healthy, and the flock is kept for hours together in this state, until the diseased sheep have been treated with a strong decoction of sheep dip. This system is to be strongly condemned, for not only is the flock prevented from grazing for some hours during two or three days in the week, but even when the sheep are driven to the veld, the scabby animals spend a great deal of their time in scratching and tearing at the infected spots, when they might have been more profitably employed in resting and grazing. Farmers have been heard to bemoan the state of their flocks, and say—"it would have paid infinitely better to have dipped and not hand-dressed." And yet in spite of such admissions, the lesson is very seldom learnt, and the next dry season witnesses a repetition of the blunder followed by similar loss and mortality.

September saw some very heavy importations of stock, principally for butchering purposes, the large proportion being landed at Cape Town. By the S.S. *Haversham Grange* on the 12th, Messrs. Tetley & Fleming imported from Argentina, 12 geldings, 82 mares, 735 mules, 4,354 sheep and 99 oxen, the biggest shipment of stock that ever entered the port of Table Bay. They arrived in excellent condition and on the voyage only five sheep and one horse died. On the same date by the S.S. *Kelvin Grove* Messrs. Govey & Co., imported 48 geldings, 4 mares, 959 mules, 22 donkeys, 1,000 sheep and 210 oxen, and on the 20th the South African and Australian Cold Storage Co., imported per S.S. *Isel Holme*, 3,221 sheep, 22 geldings, 30 mares, 100 oxen and 28 pigs. These three shipments make a very big total, and should assist in easing the stock market both for slaughter and draught purposes.

Among the importations was a fair show of blood stock for breeding purposes. Mr. Mellish, ever to the fore, imported a couple of thoroughbred stallions of whom we should hear more later on. Mr. F. Willis landed a thoroughbred mare, and Mr. D. Ward another. A shorthorn bull and two heifers arrived for Mr. Dieser, and a shorthorn cow for Mr. Keegan of Cape Town. In addition to these, six geldings were landed for Mrs. Ross.

Brewers grains are so well-known as a succulent food for nearly every kind of stock that there is no need to recommend them. But in the advertising pages of this issue an announcement will be found offering dried grains for sale for stock-feeding. The system of drying the grains so admirably carried out by Mr. Edwards at

Newlands—a personal visit satisfied us as to the care and completeness of the operation—enables the stock owner at a distance to add this valuable food to his other feeding stuffs. In the old country the wet grains have long been a popular food and now horses and cattle are being fed on the dried product and take to it with avidity. As a food it is cheap and nourishing and as it is now available in quantities by rail, should soon be a general favourite. It mixes well with mealies.

The saw-fly, parent of the Pear Slug, is now about looking for accommodation for her progeny, and anyone with a few moments to spare when amongst trees that become infested will be well repaid if he watches her. She is a small black fly, smaller than the house fly, and is generally found without difficulty as few other flies have business about the foliage of clean trees at this season. The hop-like flight from twig to twig and the rapid running over and under the leaves assist in recognizing her. Towards sun-down she is sluggish and may be easily caught with the thumb and finger, and if she is disturbed, she may roll herself up and drop to the ground as would a calandra. As one watches her, he comes to understand why she is called a "saw-fly" for now and then she will run around back of a leaf, extrude a saw-like instrument from her abdomen and, choosing a spot at which to work, start sawing away from side to side. The tissue of the leaf is quickly cut through, and, without breaking it, she skilfully separates the upper surface so that in a minute she has made a little pocket in which to lay an egg. The egg is brought down and pushed into place without delay, and then the little worker comes running around to the top of the leaf for a rest from her exertions. Some leaves get far more than their share of eggs, particularly when they are in advance of their fellows and the flies are about in force.

The eggs are quite conspicuous from the tops of the leaves and become more so as the leaf dries out about them and as they swell in development. They look like tiny pearly shells through the translucent skin of the leaf. It takes them a fortnight or more to develop and on hatching they cut their way upwards and thus appear on the top of the leaf. The egg stage seems a perilous one for the insect. A great many eggs fail to hatch. In some other countries an excessively tiny fly attacks them, laying an egg in all it finds, and the result is that in place of a leaf-feeding slug the saw-fly egg ultimately yields a winged parasite. This friend of the orchardist has not been observed at the Cape.

Young slugs appear on the trees all through the spring and early summer. They have been found as early as the third week in September and as late as the last week in June. The majority of the first brood come from the middle of October to the middle of November in the Cape Peninsula. The individual slug feeds

for three or four weeks. At intervals it casts its skin and, evidently having a high opinion of itself, it turns about and eats the old skins each time but the last. After the last occasion it fails to get the dark slimy coating that earlier characterized it and remains rather yellow, clean and dry. It seems ashamed of its former dirty self, as it were, and quitting the tree without feeding it digs into the soil and there buries itself alive. The summer brood or broods change to the pupal stage in about a week, and a week and ten days later come out as flies; but the last slugs of the season remain as slugs in their little earthen cells an inch or two down in the ground all through the winter season, and until warm weather again approaches.

Trees in soil taken from one place to another are liable to be accompanied by some of the slugs in their earthen cells. It is probably owing to such accidents that the introduction of the pest into America, Australia, New Zealand and South Africa has been due; and observant readers whose farms are free of the pest will take note that in this way they may introduce it. In our best nurseries the pest is kept so well suppressed that there is little danger of getting it from them, but the careful man will be on the watch that he may stamp out any local outbreak.

The slugs feed exposed on the upper surface, and do not eat entirely through the leaves. Their tadpole-like form, and dark greenish coating of slime make them easy of recognition. When full grown they are nearly a half-inch in length. In this country they are chiefly known on pear trees, but they are equally fond of cherry, and often do serious injury to some kinds of plums. Medlars, too, are often attacked and occasionally a few are found on apricot, peach and other trees. The slimy coating is probably some protection from parasitic and predaceous insects, but at the Cape there is a kind of bug that relentlessly spears them and sucks them quite dry, whilst in Europe several internal parasites have been reared from them.

No other fruit tree pest, perhaps, is so easy to suppress as the pear slug. The best remedy is spraying with Paris green in water at the rate of one pound to two hundred gallons (a quarter ounce to a paraffin tin,) or with some other arsenical poison in a proportionate strength. White hellbore at the strength of an ounce or more to a paraffin tin full of water is also a good remedy, and is preferred by many as it is not a violent poison. Soap and water in the proportion of two pounds to a paraffin tin is likewise very effectual. But all things considered the arsenical preparations are most satisfactory. Heavy rains and dust storms destroy vast numbers of the slugs; and it is a custom with some people to unwittingly imitate this natural remedy by throwing road dust, ashes, or slaked lime over the foliage. Remedies should be used as soon as the eggs are seen to have hatched; the first spraying is generally needed about November 1st in the Cape peninsula,

RABIES OR HYDROPHOBIA.

THE DISEASE AND ITS HISTORY.

DIAGNOSIS AND TREATMENT.

PASTEUR'S ANTI-RABIC INOCULATION.

BY WM. ROBERTSON, M.R.C.V.S., GOVT. VET. SURGEON.

Rabies or Hydrophobia is one of the oldest known diseases of animals, and since Aristotle described it in dogs, and stated they could infect every creature except mankind there have been persons who have expressed their doubt as to whether the Hydrophobia of man was a specific disease, or a disturbance of the nervous functions, brought on by fear and distress. We find allusions to the disease in the works of Virgil and Ovid, and some of the older writers give remedies for the bites of rabid animals. Homer is supposed to refer to Rabies when he mentions the dog star or "Orion's Dog," as exerting a malignant influence upon the welfare of mankind and the superstition that it is at a certain period of the year (dog days) when most cases of Rabies occur has lasted to our own time. Pliny alluded to the cause of Rabies in dogs and attributes it to a worm in the animal's tongue and says "If this be removed from the animal while a pup it will never become mad or lose its appetite. This worm after being carried thrice round a fire is given to persons who have been bitten by a mad dog to prevent them becoming mad." This brutality of removing a supposititious worm (generally a portion of the *fraenum linguae*) is practised in our own times under the name of "worming" and ranks as a prophylactic measure with the brutal practice of cutting off the haw or *membrana nictitans* in the dog's eye as a preventive of distemper.

Zinke in 1804 inoculated a dog, a rabbit and a cock with saliva from a rabid dog. The dog showed some symptoms on the eighth day and was rabid on the ninth, the rabbit on the eleventh and the cock on the fourteenth day (Fleming). During the next century many workers corroborated these statements, duplicating the experiments and demonstrating the inoculability of Rabies from man and animals to the horse, ox, sheep, pig, cat and wild animals of various species, particularly the fox and wolf.

During the eighteenth and nineteenth century the disease appeared in Europe, and from that date outbreaks are recorded which have raged with more or less severity in various countries of the world.

IT FIRST APPEARED IN SOUTHERN AFRICA,

at Port Elizabeth, it was quickly stamped out and has reappeared in Matabeleland due to infection from the north, *i.e.* the Barotse country, and is the more serious on account of the number of dogs owned by the natives, and the chance of the lower carnivora becoming affected.

Most of the countries of the world have had visitations from the disease but it is unknown according to reliable evidence in Australia, New Zealand, the Azores, St. Helena, Madeira or Sumatra. It is very frequent in Western Europe and is evidently on the increase; France and Germany suffer more than other Continental countries and England is frequently visited. It is heard of in China, very frequent and fatal in India, in the Americas and Asia generally and the Holy Land and there is no reason to doubt that it has existed for centuries in Egypt, Northern Africa and Arabia. An ancient treatise in the latter language (El Nacici) on the horse and other domesticated animals written seven centuries ago, describes the effects of the bite of a rabid Dog upon a horse with remarkable detail and clearness (Fleming.)

ANIMALS AFFECTED.

The disease can be transmitted by inoculation to Carnivora, Herbivora, Omnivora and it would appear to all warm blooded animals, and infection can only take place by direct inoculation *i.e.*, the virulent fluid from an animal suffering from Rabies must be introduced into the constitution before a susceptible animal can contract the disease.

SYMPTOMS IN DOGS.

The incubative period of Rabies is very variable, cases being on record in man where a period of seven months has elapsed between the infliction of the bite and the appearance of the symptoms, in dogs the incubative period is generally under three weeks. As there are two distinct forms of Rabies in dogs so there are two distinct sets of symptoms for

- (1) Raging or Furious Rabies.
- (2) Dumb Rabies.

In the first form the course of the disease is divided into three stages:—

The First or Melancholic Stage.

The Second or Furious Stage.

The Third or Paralytic Stage.

The first stage lasts about a couple of days, the second four or five, and the third a like length of time.

In an animal affected with the disease and which, being a companion, is probably under continual observation the first thing noted is a general change in the dog's demeanour, the animal is unusually irritable, or extremely affectionate, seems depressed, looks to its master, as it were for help and frequently strives to arrest his attention by licking hands and face, it hides away and is constantly changing its resting place.

In about a couple of days the symptoms usually associated with Rabies present themselves, the dog generally absents itself from home, and goes off on a long prow, travelling at a jog trot, seeming almost oblivious of surroundings, it travels straight and will bite objects and animals which appear in its track. Sometimes there are wild fits of frenzy in which the animal becomes extremely aggressive and attacks animate and inanimate objects.

It is during these fits that the greatest amount of mischief is worked by the mad animal.

It manifests a great desire to chew hard foreign bodies such as sticks, grass, tin, wood shavings, earth and stones, and if the animal passes a little urine it at once turns and licks it up. It will even bite iron bars and live coals, if such articles are presented to it. Some dogs chew their own limbs and genitals. It is at this stage that the peculiar howl of the mad dog makes itself known. This alteration in voice is no doubt due to a partial paralysis of the vocal cords, diminution of the orifice of the glottis and consequently a higher note is emitted. This howl is a peculiar hoarse, rough, howling bark, the first notes of which are prolonged into a high-pitched drawn-out howl.

In the paralytic stage the animal gradually loses power of one or more sets of organs. It may commence with loss of power in the hind quarters which are dragged in locomotion, paralysis of the tail and lower jaw are usually present later. The animal becomes miserably thin with staring coat and hair on end, and quite unrecognisable and the dog succumbs on the eighth, ninth, or tenth day of the disease from exhaustion and paralysis of the brain.

If the above symptoms are read it will be noticed that no mention is made of the popular belief that a mad dog fears water, the name Hydrophobia tends to strengthen this opinion. This is not true, rabid dogs, and other affected animals for the matter of that, do not fear water, and I have frequently seen such animals drinking, but when the later stage of the disease appears you get great difficulty in swallowing due to paralysis of the muscles engaged in that act, and consequent excitement manifested by the patient.

Again, the eyes of rabid dogs are not always red nor do they generally run straight ahead with their tails between their legs and saliva and froth flowing from their mouths, like the popular idea of a mad dog seen as illustrations in certain periodicals.

DUMB RABIES.

Is characterised from the previous form by the absence of mania, the complete paralysis of the lower jaw and sometimes of other organs, and dribbling of saliva from the mouth. This form is as deadly as the other if the infective material (saliva) can obtain entrance into the constitution, but owing to the fact that the animal is in a state of incapability to bite is not so dangerous.

POST-MORTEM APPEARANCES.

In diagnosing a case of Rabies after death a great deal of importance must be attached to the history, as regards the animal's behaviour previous to death or destruction, as the lesions seen on *post-mortem* are by no means specific and diagnostic.

The body is very emaciated (if the animal has been allowed to die), the tonsils and pharynx are inflamed, intestines empty, respiratory membranes purple, and lungs frequently much congested. The stomach frequently contains straw, hair, feathers, pebbles, tin, leather and stones, but no food. Axe found foreign substances in 90 per cent. of several hundred rabid dogs which he examined, and considers this condition of the stomach the most important feature of the whole autopsy.

In considering whether a dog which has bitten certain persons or animals is really rabid—the said dog is generally killed before a man competent to judge can be called in—I would impress upon everyone the importance of not killing a suspected rabid animal before one able to give a definite opinion has seen it, especially if such has bitten men, or other animals. Much can be done with the live suspected animal (and fears of bitten persons can be alleviated if the animal proves not to be rabid or the diagnosis of the true nature of the disease can be confirmed, and the bitten persons treated accordingly); but little can be done with a mangled, shot riddled putrid carcase which is generally all that remains of the suspected rabid animal.

So it is by considering the history that we are assisted in making the diagnosis of Rabies in the dog, positive proof of a bite having been received by this dog is of primary importance, the appearance of symptoms of irritation, madness and paralysis, add to these the negative *post mortem* examination and if such a thing is possible, immediately after death remove the head of the suspected animal, wrap in antiseptic cloth and forward to the nearest professional man who is capable of conducting the necessary test inoculations. If an emulsion of the brain or spinal cord of an animal suffering from Rabies be inoculated into the anterior chamber of the eye or under the covering of the brain of a rabbit (subdural) the rabbit will present symptoms of Rabies in from fourteen to seventeen days. This is an operation requiring great care and skill, so that the symptoms of Rabies if they arise will not be complicated by symptoms, the result of the inoculation. (*Septicæmia*).

It can easily be seen how very satisfactory such an inoculation test is, as by it can be definitely settled whether a certain dog was or was not the subject of Rabies, and either relieve the bitten person's mind or hasten his departure to the nearest Pasteur Institute.

DISEASES WHICH MAY BE MISTAKEN FOR RABIES.

Certain diseases may be confounded with Rabies in the dog (and people's judgment and discernment are apt to become twisted as regards Rabies diagnosis when that disease is known to be in a district) as Hyperæmia or Inflammation of the brain; Parasites or tumours in that organ. Parasites in stomach, intestines or kidney, rupture or perforation of the viscera. Apoplexy, and foreign bodies in the throat are confounded with dumb Rabies due to the dropping of the lower jaw and the flow of saliva.

TREATMENT.

This is purely preventive, as no form of treatment has proved of any avail after the appearance of the symptoms of the disease, although in men we should cauterise or otherwise clean the bite from a rabid animal and follow this up by inoculation, this must be taken in the light of preventive treatment, *i.e.*, preventing the virus from entering the constitution by the port of the bite. Preventive measures to diminish the number of cases of Rabies consist in the enforcement of proper Police regulations, since it has been proved that Rabies can spread alone by the bite (or introduction of infective material into a clean animal) so the remedy is to prevent the commonest biting domestic animal—the dog—from getting bitten and, if he becomes rabid, from biting others.

In most large towns on the Continent the imposition of a dog Tax and the enforcement of muzzling orders have proved most effectual in checking the spread of Rabies, when muzzles are of the proper character and *constantly* worn in public.

It is extremely interesting to glance over the Rabies section of the various Government Reports in certain European countries such as Saxony, Bavaria, or Prussia, and observe the sudden decrease in the number of cases of Rabies, which has always followed the enforcement of rigid police regulations.

The first date is the year in which the regulations in regard to Rabies were put in force.

Bavaria in	1874	...	...	53 cases
"	1885	..	...	Nil.
Saxony in	1866	...	...	287 cases
"	1885	...	...	10 "
Prussia in	1878	..	...	672 "
"	1885	...	...	352 "

And though in Great Britain the regulations against Rabies have proved ineffectual to completely stamp out the disease, the good effect of the muzzling order of 1895, despite its partial application,

is shown by the following table of canine rabid patients. The regulations were enforced in February.

January	...	20	July	...	14
February	...	25	August	...	2
March	..	22	September	...	1
April	...	11	October	...	4
May	...	11	November	...	2
June	...	12	December	...	4

(" Vet. Path. Frohner and Freebinger.")

Hunting suggests that "the muzzling Act to be reasonably effective should be put in force, immediately a case of Rabies is reported, through the surrounding country say for a radius of ten or twenty miles, and should be continued in that area for a term sufficient to cover a fairly long period of incubation *i.e.* not less than 3 months. During an outbreak, every wandering dog which has been taken up by the Police, if not destroyed in the meanwhile should be segregated in a separate cage for at least eight days."

TREATMENT OF BITTEN PERSONS.

This should be immediate, thorough and complete, and have as its aim the prevention of the virus spreading from the point of entrance through the entire constitution.

If the bite is on hand, arm or leg, the part above the bite should be compressed by a ligature, bootlace or handkerchief as in snake bite, and the bite well washed with warm water, *i.e.* washed to the bottom and irrigated with some strong solution of a reliable disinfectant such as *Mercuric Perchlor* 1 in 1,000 water, hot Creolin Solution 1 in 30 water, Jeye's Fluid, Little's Sheep Dip or other antiseptics in similar strengths. Strong solutions of Blue Stone, Chloride of Zinc, Nitrate of Silver (Lunar Caustic) are all good, but the fact must be borne in mind that the bottom of the wound must be got at and cleansed, it is worse than useless to cauterise the top of a punctured wound with hot iron or caustic and so simply seal up the bite and form a pocket for the preservation of the Rabies virus. After the complete disinfection of the wound, a dressing of a simple nature (carbolic ointment) can be applied. In cases of bites in face and body the same routine can be carried out minus the ligaturing.

If the animal which inflicted the bite can be caught uninjured, let this be done and let it be kept tied up for a time until such symptoms appear as renders the diagnosis of Rabies certain and the dispatch of the patient to a Pasteur Institute desirable, or until the animal has recovered or succumbed from the disease simulating Rabies.

PASTEUR'S PROTECTIVE INOCULATION AGAINST RABIES.

As before stated the nervous system, brain and spinal cord of an animal affected with Rabies is highly infective, containing as it does the virus of the disease in an extremely active state. Pasteur in 1884 found that these parts of the nervous system from animals affected

with Rabies could be weakened or attenuated by hanging them in dry bottles (cut into small lengths) over Caustic Potash at a temperature of 20°C . for several days, the weakening in virulence of the cords being in direct proportion to the time they were exposed to dry air over Caustic Potash.

For instance take a piece of cord, dried for 24 or 48 hours, inoculate this into a rabbit, the animal will die in seven days; but if the cord has been dried for about a week it takes 15 days to kill another rabbit. It was found that animals could be rendered immune or protected against the Rabies virus by starting inoculation with cords which had had a long exposure to the Caustic Potash and gradually repeating the inoculation with cords of higher virulence and shorter exposure to Caustic Potash. As Rabies virus can be weakened or attenuated by exposure to dry air so it can be strengthened or exalted by passage through rabbits, when the virus will be found to kill quicker and quicker as the number of rabbits were employed, until the maximum period is reached, *i.e.*, the 50th rabbit dies in seven days. As said before the ordinary fresh virus like saliva or nervous matter has an incubation period of 15 or 16 days. These experiments of Pasteur were tested by a committee of French savants and from this work has grown his Anti-Rabic Inoculation Institutes which are to be found in France, Russia, Hungary, Austria, Italy, &c., and over 10,000 people have been inoculated by his method. The inoculation material consists of a small quantity of the least virulent cord (from a rabbit which has succumbed to Rabies), *i.e.*, which has been exposed for the longest period over Caustic Potash is ground up with a little sterile water or beef broth and injected under the skin of the abdomen. The injection is repeated at frequent intervals for a fortnight, cords of greater virulence being used in an ascending scale.

By this method it is claimed that the mortality in Rabies has been reduced from 10 to 1·2 per cent. Certain more recent methods of protective inoculation have been put on record during the past two years but in the main they follow and corroborate the work of Pasteur. Pasteur's work and the employment of his preventive inoculation has met with many doubters and many opponents.

Rabies is such an uncertain disease, has an extremely variable incubative period (and as a rule the dog which inflicted the bite is not forthcoming) that strict statistics as to its reliability are difficult and well nigh impossible to obtain. Perhaps the dog which bit the patient may not have been mad and without Pasteur's inoculation the bitten person might have been all right. Again many authorities ask "Does not as much credit for the prevention of the disease lie with the cauterisation and local treatment of the bites as with the subsequent Pasteur inoculation?" Again it is stated that persons sent and treated at the Pasteur Institutes die,—that is quite possible if too long a time has elapsed between the infliction of the bite and the employment of the Anti-Rabic inoculation. The percentage of people which are bitten by an actual rabid dog and so contract the

disease is given at from 8 to 47 per cent. But there seems no doubt that the employment of the methods of protective inoculation against Rabies in man as laid down by Pasteur has resulted in a great decrease in the mortality from that disease. It may be added that protective inoculation of dogs is impracticable and statistics prove that Government Regulations for the contagious diseases in animals, taxes on dogs and the compulsory wearing of suitable muzzles in town are amply sufficient to successfully combat Rabies in dogs and indirectly in man.

THE RHODESIAN OUT-BREAK.

While in Rhodesia passing through Bulawayo in the latter end of August, I there in company with Mr. Hutcheon, C.V.S. Cape Colony and Mr. Gray, M.R.C.V.S., Chief Inspector of Stock, Rhodesia, made a *post mortem* upon a dog which had died the previous evening under conditions which caused suspicions that the animal had been affected with Rabies.

History.—The subject a brindled Kaffir dog about the size of a pointer had suddenly appeared in the stable yard of Mr. Townsend's house on the outskirts of Bulawayo, and at once flew at a horse standing there inflicting a ragged wound upon the animal's upper lip. The boys state, while they summoned the owner of the horse the dog died.

Post Mortem.—I saw the dog next day, the animal appeared fairly well nourished and presented no external marks of violence.

On removing the skin, a great number of bruises were noticed on back and ribs (evidently the boys in the stable yard had assisted nature in finishing off the animal.)

Pharynx.—Slightly congested.

Lungs.—Stained (in part due to congestion and hæmorrhage as result of blows) in patches.

Stomach.—*Crammed with rubbish, grass roots, sticks, straw, etc., no food.* M. membrane slightly congested.

Blood.—Fluid, thick, dark and tarry; other organs normal.

From the history and *post mortem* appearances Dr. Hutcheon and myself agreed that the evidence pointed to Rabies and justified, in fact called for, prompt and stringent measures on the part of the Government.

As I was leaving for Cape Town the following morning it was impossible to confirm our diagnosis by inoculation experiments.

A committee of management was at once formed and those measures which experience has taught were best, were at once put in force. Posters and handbills stating in clear language the symptoms of the disease, and best treatment of bitten persons widely circulated, and an expert trained in the preparation and employment of Pasteurs Anti-Rabic Inoculation at once cabled for to Paris.

I advised that the bitten horse be kept under strict observation, and under date September 22 I have received a wire from Goyt, Veterinary Surgeon, Edmunds, Bulawayo in, which he states that "Mr. Townsend's horse is developing symptoms of Rabies."

HEARTWATER IN SHEEP AND GOATS.

SPECIAL TICK INVESTIGATIONS.

BY THE GOVERNMENT ENTOMOLOGIST.

SATISFACTORY RESULTS.

PREVENTIVE RECOMMENDATIONS.

The Annual Report of the Government Entomologist Mr. C. P. Lounsbury for 1901 is a document of absorbing interest from end to end, and not the least interesting portion is that dealing with the elaborate series of experiments undertaken in connection with the disease known as Heartwater in sheep and goat's. In his introductory remarks Mr. Lounsbury says:—

Experimental research to determine the relations, if any, that exist between the sheep and goat disease known as heartwater, and the various species of stock-infesting ticks that occur in the affected territory, has formed a very important part of the year's work, and has had the uninterrupted personal attention of the writer throughout the whole period. A number of important findings has been made. Thus far only one species of tick, the so-called Bont Tick (*Amblyomma hebraeum*), has been found to be associated with the disease. A single specimen of this species if fed on a heartwater-sick animal as a larva or "seed" tick has been found capable of transmitting the malady with fatal effect. An animal pastured on veld heavily infested by the tick may drop hundreds and even thousands of pathogenic larvæ during its period of illness, and thus may indirectly serve for the almost total extermination of a flock in a few months. The terrible mortality amongst healthy flocks, brought to the coast where the tick is abundant, is thus easily explained. Pathogenic larvæ have been found to retain their dangerous character until they are adult. They may take their second or nymphal feeding on an ox or a non-susceptible goat and then in the third or final stage get on to a susceptible sheep or goat and give it deadly fever. On the other hand, the disease appears to be non-transmissible through the egg stage, and the species is normally non-pathogenic in all stages. A farm may be badly infested with Bont Tick and yet be entirely free from heartwater.

The Red Tick (*Rhipicephalus evertsii*) and the Blue Tick (*Rhipicephalus decoloratus*) appear to take no part in the carriage of this disease.

Only the entomological phase of the heartwater problem, that is the association of ticks in transmitting the disease, is engaging my attention. Other phases have received, and to some extent are still receiving, the attention of the Veterinary Department and of the Bacteriological Institute; but thus far the side of the question that to my mind is of the greatest economic importance has been left untouched. I refer to experiments to test the practicability of eradicating the disease and of keeping the tick suppressed. Everything that has been learned to date regarding the nature and spread of heartwater appears to me hopefully indicative that the disease is one which may be eliminated by the temporary exclusion of stock susceptible to it; and in the nature of things the tick may be almost, if not wholly, exterminated by the exclusion of all stock. I believe that two years would suffice to practically eradicate the tick from a well-enclosed camp. The disease would, I expect, die out in less than eighteen months, and the ticks be very few in twelve months. Only by actual experiment can the feasibility of overcoming the disease on a farm by such starvation means be satisfactorily determined, and I respectfully suggest that it would be a wise act for the Government to get control of portions of a few notoriously bad heartwater farms in different districts, to securely enclose these, and to arrange with the owner and police to occasionally patrol the fencing to see that it remains intact. Each enclosure might be sub-divided into paddocks, and these paddocks be experimentally stocked in succession at the expiration of twelve, fifteen, eighteen, twenty-four and thirty months. The enormous losses due to ticks, apart from their connection with the disease, fully warrant the undertaking of such a series of experiments.

There is wanting, too, a more complete knowledge of the value of the various substances that may be applied to stock, by dipping or by spraying, for the direct destruction of ticks and for deterring their attack. The field is not a promising one, and an experimenter might work diligently for four or five years and then have succeeded in finding no substance superior to those whose value we now know, yet the need of a cheap and efficient tick-destroyer and a tick-deterrent is so great that systematic endeavours should really be made to ascertain if they exist.

THE EXPERIMENTS.

EXPERIMENTS RESULTING POSITIVELY.

The experiments resulting positively were all in the use of the Bont Tick, (*Amblyomma hebraeum* Koch); for this reason the name of the tick is omitted in the sub-headings.

A. INFECTION TRANSMITTED BY NYMPHS FED AS LARVÆ ON SICK ANIMALS.—That nymphs of the Bont Tick fed on animals sick with

heartwater were capable of transmitting the disease to susceptible animals was conclusively demonstrated in the 1900 series of experiments. More proof as follows was obtained during 1901, chiefly by the infection of animals through this means whose susceptibility to the malady it was necessary to establish in order to prove the worth of previous negative tests :—

1. Animal No. VI, Boer ewe goat, received December 25th, Cape Town stable. Infested January 28th with 100 nymphs as larvæ from sick ewe December 26th. Fever appeared on February 8th and terminated fatally February 18th.
2. Animal No. VII, Boer ewe goat. Received January 20th, Cape Town stable. Infested February 11th with 5 nymphs as larvæ from sick goat December 26th. Fever appeared February 26th and terminated fatally March 1st.
3. Animal No. XII, Boer ewe goat. Received January 26th, Cape Town stable. Infested March 5th with one nymph as larva from No. IX sick February 4th. Fever appeared March 19th and terminated fatally March 23rd.
4. Animal No. XVIII, Boer ewe goat. Received January 20th, Cape Town stable. Infested March 27th with 32 nymphs as larvæ from No. IX sick February 4th. Fever appeared April 9th and terminated fatally April 12th.
5. Animal No. XXV, Boer ewe goat. Received March 16th. Infested March 20th with 2 nymphs as larvæ from No. IX sick February 4th. Fever appeared April 3rd and terminated fatally April 12th.
6. Animal No. XXXIII, Boer ewe goat. Received April 12th, Rosebank stable. Infested June 12th with 10 pathogenic nymphs June 12th. Fever appeared June 26th. Animal destroyed for its fevered blood June 28th.
7. Animal No. XXXV, Boer ewe goat. Received Rosebank stable. April 12th. Transferred to Rosedale April 20th. Infested April 28th with 10 pathogenic nymphs. Fever appeared May 9th and terminated fatally May 15th.

These records afford striking evidence of the transmission of the disease from sick to healthy animals through the agency of the Bont Tick in its nymphal stage. A single one of the tiny creatures proved quite sufficient to fatally infect a healthy susceptible animal (3). The virulence of the disease in all seven cases was very marked. In no case in which nymphs were applied, after they had fed as larvæ on a sick animal, has the fever failed to appear, neither in the 1900 experiments when ten goats were infected nor during the present year. The period from the application of the ticks to the detection of fever by the thermometer ranged from eleven to fifteen days with an average of thirteen and one-third days.

Still other evidence of the transmission of heartwater by nymphs is furnished by Mr. Dixon. On his return to his Somerset East headquarters in March last after an absence of some weeks he found that his strain of infection had been lost. To enable him to get a new strain, I sent him pathogenic nymphs; and in May he wrote: "The Bont nymphs gave the fever all right and killed both goats infested."

B. INFECTION TRANSMITTED BY ADULTS FED AS NYMPHS ON SICK ANIMALS.—The very first test made in the tick-heartwater investigations was with adults fed as nymphs or sick angora goats. A mild attack of fever followed (1899 Report, p. 24-27). The record of the only other test of the kind is as follows :—

- 1.—Animal No. IV, Boer ewe goat. Received Cape Town stable December 25th, 1900. Infested January 3rd with about 20 males, and January 8th with 20 females, all from goats VII and VIII of 1900 series, as nymphs, when in fever

April 23rd to 28th. Fever appeared January 18th, and its heartwater nature affirmed by the inoculation of VIII and IX. No. IV recovered, but both the inoculated goats succumbed.

Doubtless adults fed as nymphs on sick animals are quite as capable of transmitting the infection as nymphs fed as larvæ on the same animals. It is worthy of note that the adults infecting No. IV had had their nymphal feeding over *eight months* before; they moulted during July, and hence had been awaiting a host for about six months. The mild character of the infection they transmitted may have been due to the long delay in transmitting it.

C. INFECTION TRANSMITTED BY NYMPHS FED AS LARVÆ ON RECENTLY RECOVERED ANIMALS.—The experiments under this head really belong to 1902, but they are inserted here for the sake of completeness.

1. Animal No. L, angora cross ewe goat. Received Cape Town stable October 29th. Retained as check goat only until December 14th, when infested with nymphs from XLIV on November 11th. XLIV was a boer kapater that had been in severe fever (from blood inoculation) between October 20th and October 25th. Only two ticks were found attached to L on January 16th, and more of the same lot were applied January 18th. No recoveries were made until the 26th. In all 26 were recovered. Fever appeared December 31st, and terminated fatally January 7th.
2. Animal No. LI, angora cross ewe goat. Received with L and like it kept unused for several weeks. Infested December 18th with nymphs from XL on November 11th. XL was a boer ewe that had been in severe fever (from blood inoculation) between October 19th and October 28th. About 50 of these presumably pathogenic nymphs were applied December 18th, about 60 more December 17th, about 200 more December 21st, and 100 December 28th. The first recoveries were made December 21st, and from then to January 11th about 375 were recovered. Fever appeared December 30th and ran a long low course until January 22nd. At no time was there lack of appetite or other external symptoms of illness.

Evidently Bont nymphs from recently recovered animals convey the disease. The fact that the blood of such animals is virulent has, I believe, been recently shown by Mr. Dixon. The fever of LI was peculiar by its extreme length and its low readings. Perhaps its length was due to the successive applications of the infective ticks, as the date of the final subsidence is about the time one would have expected its cessation from the last applied ticks. The incubation period of the fevers in both L and LI, 17 days, is unusually long. Probably both XL and XLIV were both losing the capacity to infect ticks when those used were recovered. A test of ticks from XL on December 2nd is in progress at the time of writing. [This test resulted negatively, thus demonstrating that the recovered animal soon lost its capacity to infect others.]

D. INFECTION TRANSMITTED BY ADULTS FED ON COW AS NYMPHS BUT ON SICK ANIMALS AS LARVÆ.—The object of this series of experiments was to ascertain if the infection could persist in the tick over a feeding stage. Positive results were so unexpected that the test was thrice repeated. The larvæ used were dropped by dying heartwater goats. Soon after they moulted to the nymph stage they were fed on the cow; and then after having moulted again they were tested on the susceptible goats. The cow did not appear to

become affected although many thousands of the nymphs were fed on her.

1. Animal No. XI, Boer ewe goat. Received Cape Town stable Jan. 20th. Previously used in LII experiment. Infested March 13th with 20 males from cow February 9th and from dying "kapater," as larvae, December 29th. Fever appeared April 8th and terminated fatally April 7th.
2. Animal No. XIII, Boer ewe goat. Received Rosebank stable February 19th. Previously used in N experiments. Transferred to Rosedale March 28th and infested with 20 males to which 20 females were added April 3rd; all from cow February 9th and from dying "kapater," as larvae, December 29th. Fever appeared April 17th and terminated fatally April 19th.
3. Animal No. XIX, Boer ewe goat. Received Cape Town stable February 19th. Infested March 5th with 20 males from cow about February 9th and from dying "kapater," as larvae, December 29th. None seen attached until March 7th. Females applied March 21st. Fever appeared March 22nd and terminated fatally March 23rd.
4. Animal No. XXIII, Boer ewe goat. Received Cape Town stable March 16th. Infested March 19th with 20 males from cow about February 9th and from dying "kapater," as larvae, December 29th. Fever appeared April 6th at night and goat found dead on following morning. *Post-mortem* examination not entirely conclusive of heartwater, yet fever was appearing when it was looked for and no other explanation for death was suggested. Animal was very thin but had been feeding all right.
5. Animal No. XXVI, Boer ewe goat. Received Cape Town stable March 16th. Infested March 23rd with 20 males and 20 females from cow about February 9th and from dying "kapater," as larvae, December 29th. No female attached until March 30th. Found dead morning of April 13th after as temperature reading of only 104° on previous evening and 100·7 previous morning. *Post-mortem* examination showed heartwater, yet appearances were not wholly typical. The animal had been in poor condition and had suffered from diarrhoea for ten days before death. If death was from heartwater the adult ticks may not have been responsible, as on March 27th the test was vitiated by the finding of a stray nymph in the cloth garment.
6. Animal No. XXIX, Boer ewe goat. Received Cape Town stable April 12th. Infested April 13th with 20 males from cow in March and from dying IX, as larvae, February 4th. Nine ticks only attached. On May 14th, 12 females were applied. Fever appeared May 24th and terminated fatally May 26th.
7. Animal No. XXX, Boer ewe goat. Received Cape Town stable on April 12th. Infested April 13th with 25 males from cow in March and from dying IX as larvae. Only 8 attached. Fever appeared May 2nd and death occurred May 6th.
8. Animal No. XXXI, Boer ewe goat. Received Cape Town stable on April 12th. Infested April 13th with 25 males from cow about February 9th and from dying "kapater" December 29th. The attachments by the 22nd numbered 20. Animal became feverish May 6th and aborted May 8th. On the 14th the temperature was again normal. Twelve females applied on May 14th. Fever appeared on May 25th and terminated fatally May 28th.
9. Animal No. XXXII, Boer ewe goat. Received Rosebank stable April 12th. Previously used for N experiment. Infested May 8th with 30 males from cow during March and dying IX as larvae; and on May 12th 30 females were added. Fever appeared May 25th and terminated fatally May 28th.
10. Animal No. XXXVII, Boer ewe goat. Received Cape Town stable June 12th. Previously used in O experiment. Infested July 15th with large number of males from cow during March and from dying IX as larvae. About 50 attached. Females to about an equal number applied July 22nd. Fever appeared August 10th and terminated fatally August 13th.
11. Animal No. XLV, a large wether that had been in Cape Town shed for about two months. Heavily infested September 9th and 10th with males from cow in April and, as larvae, from IX when dying in early February. Numerous females applied September 13th, 19th, 21st and 27th. Total recovery 28 engorged females. Fever appeared October 8th, and from then until October 16th the thermometer readings averaged 106·6; on the latter date the animal was killed to end its misery.

This series of experiments shows very well that ticks from cattle may transmit the disease to susceptible animals, if as larvæ they fed on fevered blood. Cattle then may carry the disease into new areas.

From the records of the experiments, it appears as if many of the ticks fed on the cow, both males and females, must have lost their capacity to infect. Without assuming that many did, the long interval in some of the cases between the application of the ticks and the onset of fever cannot be explained. The infection transmitted, nevertheless, was very virulent. The impression left with me was that few of the males were pathogenic. Male Bont ticks, unlike larvæ and nymphs, are very slow about attaching to a goat or sheep unless they have been awaiting a host for several weeks. When a dozen or twenty were applied at once as in most of these tests, two or three only would generally be found attached within twenty-four hours and sometimes none would be on for two days or more; then day by day more would take hold. The female Bonts very rarely attached until males had been on four or five days and had become amorous; then they took hold at once. If females were applied before they could find partners, they were very apt to leave that animal to search over others for company, and thus introduce elements of confusion into the experiments; it was to obviate this risk as far as possible that the males were generally applied several days in advance. A score of females may cluster about a single amorous male.

Cases 9 and 10 (Animals XXXVII and XLV) were produced when no other experiment involving the use of pathogenic ticks was being conducted, and when no pathogenic ticks other than those from the cow were on hand. Mr. Robertson needed a case of heartwater for his studies and XXXVII was infected to provide him with one. The old sheep was infected two months later for the purpose of engorging females from which to get material for 1902 work and to incidentally affirm that sheep can be infected by ticks made pathogenic through feeding on goats.

Ticks of the same lot as those used in the first few cases were sent to Mr. Dixon. Later he reported: "With the adult Bonts you sent me I infected two goats. One became very ill but recovered; the other, on which I could only get one male to fix himself, gave no reaction. Since I have found the latter to be susceptible."

E. INFECTION TRANSMITTED BY ADULTS FED ON LONG RECOVERED GOAT AS NYMPHS BUT ON SICK ANIMAL AS LARVÆ.—This experiment was very similar to those recorded under D, but with a long recovered goat (66 B, ill in early part of December, 1900) substituted for the cow.

1. Animal No. XXXVI, Boer kapater goat. Received Cape Town stable June 12th. Previously used for O experiment. Infested July 11th with 12 males from long recovered goat 66 B April 3rd, and as larvæ from dying IX goat in early February. 15 females of same lot added July 17th. Fever appeared August 4th and terminated fatally August 10th. The infection must have come from the larval feeding on IX, as non-pathogenic larvæ fed on 66 B at same time failed to transmit fever.

This experiment shows that while long recovered (that is, salted) animals are not directly a source of infection (see N series) they may like cattle carry the disease into new areas by being bearers of ticks made pathogenic by having fed on infectious animals as larvæ.

F. INFECTION TRANSMITTED TO RECOVERED ANIMALS BY PATHOGENIC NYMPHS.—In experiments which will soon be described it was found that no infection arises from long recovered animals in normal temperature. It was then conjectured that such animals might have lost their immunity, and to test the matter the four recovered animals on which ticks had been reared were subjected to infestation by virulently pathogenic nymphs.

1. Animal 61 A, Angora ewe goat from Veterinary Surgeon Dixon, Somerset East, January 25th. Had had severe fever from October 17th to 30th, 1900. Infested March 17th with pathogenic nymphs from dying IX. 49 became engorged. The temperature rose to 106° on the thirteenth day and remained high until the nineteenth (March 20th-26th); then the fever subsided. At no time was any lack of appetite or symptom of discomfort manifested, and had it not been for the abnormal temperature no illness would have been suspected.
2. Animal 66 B, Angora ewe goat from Veterinary Surgeon Dixon, Somerset East January 25th. Had had severe fever December 12th to 23rd, 1900. Infested March 27th with pathogenic nymphs from dying IX. 48 became engorged, Fever became evident by the temperature on April 9th, the thirteenth day and continued until April 16th; the maximum temperature was 106.1° for the morning and 106.2° for the evening. As with 61A there were no indications of illness in the general appearance and behaviour.
3. Animal C, old Angora ewe goat from farm Hammonds, Fort Beaufort, February 12th. Was said to have had severe fever some years ago and came direct from heartwater veld. Infested during April with several dozen pathogenic nymphs. Unfortunately the temperature records were destroyed, but it was recorded that very little reaction if any was given, no reading being above 104° . On May 18th 25 c.c. of virulent blood was injected into the jugular but again the reaction was scarcely perceptible, no reading during the critical period above 103.6° in the afternoon and only one reaching 103° in the morning.
4. Animal D, old Angora ewe goat from farm Hammonds, Fort Beaufort, February 12th. This goat was No. 1 in the 1900 experiments and had had a mild attack of heartwater at Cottesbrook in February of that year. From then until sent to Cape Town it had been pastured on heartwater veld. Like C it was infested with numerous pathogenic nymphs during April with the result of causing only slightly abnormal temperatures. On May 18th 10 c.c. of virulent blood was injected intravenously, and again there were slightly higher readings than were normal for the animal about the time fever was expected; yet the maximum morning temperature was 102.8° and the maximum evening temperature 103° . Neither this goat nor C showed illness by lack of appetite or appearance.

It is not safe to draw definite conclusions from these few tests; but it appears as if animals which recover from heartwater still remain subject to infection and that their resistance when kept exposed to re-infection strengthens with time. One of the experiments planned for 1902 is to test ticks dropped by recovered goats during a period of pronounced secondary fever. It may be that such ticks are pathogenic but give rise to a milder attack than ticks from sick animals.

EXPERIMENTS RESULTING NEGATIVELY.

The experiments resulting negatively were conducted with the Bont Tick (*Amblyomma hebraeum* Koch), the Red Tick (*Rhipicephalus*

Evertsi Neumann) and the Blue Tick (*Rhipicephalus decoloratus* Koch). The last-named tick has very close affinities with *Rhipicephalus annulatus*, Say (the *Boophilus bovis* Riley of many writers), and in the near future may be authoritatively connected with that species; it presents, however, some uniform structural differences. The life cycles and habits of the two species are very similar if not identical.

L. THE BONT TICK IS NORMALLY NON-PATHOGENIC.—Perhaps no scientist would suspect this tick or any other of communicating a specific and often fatal disease like heartwater by its simple bite; but as many farmers believe the tick actually *causes*, and not alone transmits the malady, it was considered advisable to infest a susceptible animal with presumably non-pathogenic Bont ticks as a test case.

1. Animal No. VI, Boer ewe goat. Received December 25th, Cape Town stable. Heavily infested January 3rd and again January 18th with Bont larvae reared from females taken from an ox. Recovery estimated to number much above 5,000. Perfectly normal temperature prevailed throughout the critical period. Then to prove the animal susceptible to heartwater it was infected by pathogenic nymphs. (See first case in A series above.)
2. Animal No. XI, Boer ewe goat. Received at Cape Town stable January 20th. Infested February 13th with about 100 non-pathogenic nymphs from VI. Recovery counted 90. No fever produced, and to prove animal susceptible it was later infected with pathogenic adults. (See D series, first case.)
3. Animal No. XII, Boer ewe goat. Received Cape Town stable January 20th. Infested with non-pathogenic nymphs from VI on February 18th. About 75 recovered. No fever produced, and to prove animal susceptible to the disease it was later infected with a single pathogenic nymph. The result was a fatal attack. (See A series, case 3.)

No further proof than is afforded by these tests is necessary to prove the species normally innocuous so far as heartwater is concerned, but the following series is corroborative:—

M. THE PROGENY OF PATHOGENIC BONT TICKS APPEAR NON-INFECTIOUS.—All the cases of heartwater transmitted by ticks have originated from the attack of ticks that at an earlier stage in their own lives had fed on animals sick with or recently recovered from the disease. This series of tests was to ascertain if the infection could pass from one generation to another.

1. Animal No. VII, Boer ewe goat. Received Cape Town stable on January 20th. Infested same day with 1,000 or more larvae from eggs laid by two females taken from No. 3 goat of 1900 series on the first day of its fever. At least 600 larvae became engorged but no fever resulted. The animal was later proved susceptible by the fatal termination of fever resulting from 5 pathogenic nymphs. (See A series, case 2.)
2. Animal No. XXXIX, Boer kapater goat. Received Cape Town stable June 12th. Previously used in O series. Infested August 26th with larvae from females taken off XXIX when dying May 25th. 220 recovered. More larvae of same lot applied September 18th. 58 recovered. No reaction at all followed. Animal proved susceptible in November by inoculation of virulent blood.
3. Animal No. XLII, Boer kapater goat. Previously used in Q series. Infested September 6th with larvae from females taken off XXIX when dying May 25th. 315 recovered. No reaction. In November animal proved susceptible by inoculation of virulent blood.

4. Animal No. LIII, Angora cross ewe goat. Received at Cape Town stable October 29th. Infested October 30th with larvæ reared from females taken off XXXIII when destroyed at height of fever June 28th. 1,390 recovered. No reaction.

Late in the year the thought occurred to me that even if the larvæ from pathogenic mothers are non-pathogenic it would not necessarily follow that the infection has failed to persist; the larva might contain the infection but be unable to transmit it. It was therefore considered advisable to test nymphs reared from larvæ out of pathogenic mothers.

1. Animal No. LII, Angora cross ewe goat. Received at Cape Town stable October 29th. Infested October 30th with nymphs from larvæ recovered from XXXIX about September 2nd. 110 recovered. No reaction. Infested December 16th with nymphs from larvæ recovered from LIII about November 10th. More applied at intervals to December 28th. 96 recovered. No reaction whatever.

Evidently the nymphs either had no infection to transmit or were incapable of transmitting it if they had any. In experiments with malignant jaundice of the dog, it was discovered that the infection lay over in the transmitting tick from adult stage to adult stage, the larvæ and nymphs being incompetent to transmit the infection they possessed. Not knowing but that some similar retardation might occur in the transmission of heartwater by the Bont Tick when the infection was taken up by the adult stage, it was decided to try adults descending from females off of fevered animals.

1. Animal LIII, used in first section of this series. Infested December 12th with males from LII as nymphs, and from XXXIX as larvæ, and tracing to females taken off dying XXIX. 17 attached. Females applied December 17th and in a few days eight attached. No reaction.
2. Animal LVI, angora cross ewe. Received at Cape Town stable December 18th. Infested December 21st with 15 males of the same lot as those applied to LIII. All attached, and on December 27th, 15 females added. No reaction.

Evidently the tests with which the ticks were conducted were absolutely non-pathogenic. We may safely conclude at least that it is unusual, if not impossible, for the infection of heartwater to be transmitted from one generation of ticks to the next. Redwater in cattle and malignant jaundice in dogs are transmitted by the progeny of ticks from infective animals, but thus far no one has discovered how the organisms of the disease gain access to the eggs. It may be that the organism enters in the spermatozoa from the male parent, and if such were the case the progeny would be non-pathogenic unless the male had fed on diseased blood before it mated. Mating may occur some days before the Bont tick female is replete with blood; and therefore the females from which the progeny used in the experiments were reared may and indeed probably did only have sperms received prior to the fever period. Yet even if the remote possibility that the progeny of females off heartwater goats may under some circumstances inherit the parents' capacity to infect is a fact, it is unlikely that many cases of the disease are thus produced.

A few tests were made to determine if the capacity to infect persists in the progeny of Bont ticks which, pathogenic as larvæ, are fed during the subsequent nymphal and adult stages on a cow. In the D series of tests, it is shown that the adults possess the infecting property.

1. Animal No. XL, Boer ewe goat. Used in Q series during June. Infested on September 19th with large numbers of larvæ reared from females off cow in May, fed as nymphs on cow during February, and as larvæ on dying "ewe" about January 1st, 1901. Only 47 recovered but probably large numbers fed. No reaction. Animal afterwards proved susceptible through the inoculation of diseased blood.
2. Animal No. XLII, Boer kapater goat. Used in Q series during June and in the first section of this series in early September. Infested on October 10th with larvæ of the same lot as those applied to XL. 70 recovered. No reaction. Animals soon afterwards proved susceptible by the inoculation of virulent blood.
3. Animal No. XLIV, Boer kapater goat. Used before in R series. Infested August 28th with large numbers of larvæ with same history as those used on XL and XLII. 94 recovered. No reaction. Animal later proved susceptible by its contracting fever through inoculation.

Eggs from a number of ticks which were pathogenic from feeding as larvæ on IX during its fever and were fed on the cow as nymphs and on No. XLV as adults are hatching at the time of writing; and it is proposed to try the larvæ of the new generation to secure additional evidence. Animal XLV succumbed to the attack of the parent ticks.

N. BONT NYMPHS FROM LONG RECOVERED ANIMALS EITHER TRANSMIT ONLY VERY MILD INFECTION OR NONE AT ALL.—It is unfortunate that heartwater cannot be reliably diagnosed. The only way of proving a case of mild fever is by testing the infective capacity of the blood, and this is probably a far from satisfactory way in many cases, since only very mild cases or none at all could be expected. Practically mild cases are probably of little importance as, so far as known, they confer little if any immunity or tolerance towards subsequent infection. The following experiments leave it rather doubtful that any infection is transmitted to susceptible animals by nymphs which as larvæ fed on animals recovered three months and longer. The history of the recovered animals on which the ticks were fed is given under F series of experiments.

1. Animal No. XIII, Boer ewe goat. Received Rosebank stable on February 19th. Infested February 20th with Bont nymphs from 61A as larvæ about February 1st; 80 engorged and were recovered. Infested February 26th with more of same lot of ticks; 207 engorged and were recovered. Infested for the third time on March 10th, with Bont nymphs from C as larvæ on February 17th; 42 engorged and were recovered. The critical period for the first lot of ticks passed without any perceptible fever, no temperature reading for morning or night was above 103°. From the 18th day to the 31st day (March 11th to 28th) from the second lot, however, the readings average 1.6 above the average for the earlier period. With the exception of a few odd instances, the readings were fairly uniform between the two dates. The average for the morning was 102.7° and for the evening 103.4°. The animal ate heartily and appeared perfectly well. On March 28th it was removed to Rosedale and infested with pathogenic adult ticks with the result of transmitting fatal heartwater. (See D series, case 2.)

2. Animal No. XIV, Boer ewe goat. Received February 19th at Rosebank stable. Infested on February 20th with Bont nymphs from 61A as larvæ about February 1st; 88 fed and were recovered. Infested on March 10th with Bont nymphs from D as larvæ on February 19th; 208 fed and were recovered. Normal temperatures prevailed up to March 28th, when animal was removed to Rosedale and infested with pathogenic adult ticks. Before these ticks had time to give rise to fever the animal was taken with fever and died on April 2nd.†
3. Animal No. XVI, Boer ewe goat. Received at Rosebank stable February 19th. Inoculated with 10 c.c. blood from 61A February 20th. No effects became evident. Infested March 10th with Bont nymphs from D as larvæ on February 19th. 74 fed to repletion. On March 28th removed animal to Rosedale and infested it with pathogenic adults; before these had time to act fever appeared and caused death on April 4th. (See footnote to case 2.)
4. Animal No. XVII, Boer ewe goat. Received Cape Town stable February 19th. Infested February 21st with Bont nymphs from 61A as larvæ about February 1st. 127 fed and recovered. On March 15th again infested from same lot of ticks; 512 fed and were recovered. No rise of temperature was produced. Animal was in very poor condition when received. The dry forage appeared to disagree with her and about March 13th she began to suffer from diarrhœa; by the 21st she was too weak to stand and refused food. Her temperature became sub-normal, and on the morning of 25th she was found dead. The *post-mortem* revealed no indication of heartwater but was confirmatory of death being due to dietetic troubles. Several other goats, including three not used at all in the experiments, succumbed to similar troubles, in none of the cases were there the least suspicion of heartwater.
5. Animal No. XXII, Boer ewe goat. Received Cape Town stable February 19th. Removed to Rosebank March 7th. Infested March 10th with Bont nymphs from C as larvæ on February 17th. This was a poor animal which when

† NOTE.—There is no probability whatever that the infection came from the ticks purposely applied. Instead, I have no doubt that this goat and No. XVI were infected by stray ticks. At the time, I had many thousands of pathogenic ticks on hand, and through an accident which is worth describing a large number of these escaped. Ten thousand or more of the ticks were in a large thin glass beaker. On the night of March 15th I took this to Rosedale and liberated many hundreds on the cow kept there for the D series of experiments. In my haste to tie up the "pants" within which the ticks were let loose, I set the dish down rather heavily, and then, I suspect, broke a piece from the bottom. Darkness was closing in, and without noticing any break, I wrapped the glass in several thicknesses of paper and hurried away. On arriving at home, I placed the package in the wood-box for safety. Quite ignorant of the accident, I visited the Rosebank goats early the following morning. It was my custom to change my clothes before working with animals in the different stables, but that morning, being in a great hurry and having much to do, I neglected this precaution and simply pulled an old pair of trousers over those I had on. After taking temperatures, I worked some time over goats XIII, XIV and XVI, removing their garments and collecting ticks that had dropped. During the day I was puzzled to see a Bont nymph crawling on my coat, and on examining closer half-a-dozen were found. When I reached home I found more crawling over the papers about the glass beaker in the wood-box, and then the chipped bottom was discovered. Naturally, knowing that a single one of the ticks could transmit the fever, I feared having accidentally infected XIII, XIV and XVI; and before the incubation period of fever from an infection on that date would lapse I removed these three animals from the stable, which I then desired to keep free of infection, to a shed at Rosedale. The fears proved well-founded, XIV and XVI manifesting the fever and dying as recorded. Hungry Bont ticks are very active creatures, and hundreds had found the small break in the glass beaker and had contrived to make their way out through the enclosing papers. All that could be located about the wood-box were destroyed and the crevices of the box saturated with oil. At the time I imagined I had killed all that escaped there, but after events indicated otherwise. For over six months odd specimens kept turning up about the house and on the persons of members of the family. It might be thought that these were later escapes, but I am quite sure they were not. Not only was I particularly careful about the ticks after that, but the specimens found showed by their appearance that they had been waiting long for a host.

received was suffering from a caked udder and which developed diarrhoea almost at once. By gruel and brandy it was kept alive until it became evident that no heartwater was transmitted. Death from dietetic troubles took place March 28th.

6. Animal No. XXXII, Boer ewe goat. Received Rosebank stable April 12th. Infested April 13th with Bont nymphs from C as larvæ February 17th. 178 fed and were recovered. Animal aborted April 24th, and for three days the temperature was slightly above normal. After this accident the health was good and temperature normal up to May 8th, when pathogenic adults were applied. Fatal fever was thus produced. (See D series, case 9.)
7. Animal No. XXXIII, Boer ewe goat. Received at Rosebank stable on April 12th. Infested April 13th with Bont nymphs from D as larvæ on February 19th. 89 fed and were recovered. Almost uniform temperatures for both morning and evening prevailed throughout the critical period. Transferred to Rosedale June 1st and on June 12th infested with pathogenic nymphs; fatal fever followed. (See A series, case 6.)
8. Animal No. XXXIV, Boer ewe goat. Received at Rosebank stable April 12th. Infested April 13th with Bont nymphs from D as larvæ on February 19th. 85 fed and were recovered. Fever appeared April 27th and terminated fatally April 29th. (This is presumed to have been a chance infection from a stray pathogenic tick.)
9. Animal No. XXXV, Boer ewe goat. Received at Rosebank stable April 12th. Aborted April 15th. Was in such poor condition that was not purposely infested, but was placed next to XXXII, these animals being well removed from all others. Watched for ticks and 12 located in hoofs; these were undoubtedly strays from the companion goat which had Bont nymphs as larvæ from C on February 17th. No indication of fever through critical period. Removed to Rosedale April 20th. Infested April 28th with pathogenic nymphs, and from these fatal heartwater contracted. (See A series, case 7.)

From these tests it is perfectly safe to conclude that recovered goats soon lose the capacity to seriously infect other animals. Nor does any tolerance to the disease appear to be transmitted by ticks from recovered animals, as the animals succumb when later infested with pathogenic ticks. When the first goats, XIII, XIV and XVII, were infested, it was quite expected that fever would result notwithstanding that Veterinary Surgeon Dixon had found that the blood of recovered animals was innocuous; and to show the difference, if any, between the effects of ticks and blood from the recovered animal, three other goats were inoculated intravenously on the day, February 20th, that the ticks were applied. Animal XV received 5 c.c., animal XVI received 10 c.c., and animal XVIII 15 c.c., drawn from animal 61 A, the goat on which the ticks had been reared. No fever at all was produced, and XVI and XVIII at least were afterwards proved susceptible, both dying from heartwater. For a short time after the cessation of the fever, Bont ticks, and likewise blood, are pathogenic. (See C series of experiments.)

O. BONT TICKS DROPPED DURING MOST OF THE INCUBATION PERIOD ARE HARMLESS.—This experiment was to determine what menace animals coming down with heartwater are to a flock. Non-pathogenic Bont larvæ were applied to animal XVIII at the same time infective nymphs were applied, and the larvæ dropped on different days during the incubation period were kept apart.

1. Animal No. XXXVI, Boer kapater goat. Received Cape Town stable June 12th. Infested June 17th with Bont nymphs dropped by XVIII, as larvæ on April 2nd, eight days before its rise of temperature. 63 fed and recovered. No

- indication of fever resulted, and on July 11th goat infested with pathogenic adults and thus proved susceptible; see E series.
2. Animal No. XXXVIII, Boer kapater goat. Received Cape Town stable June 12th. Infested June 15th with Bont nymphs dropped by XVIII, as larvæ on April 8th, two days before its rise of temperature. Ten fed and recovered. No fever resulted, and on August 7th goat inoculated with virulent blood from XXXVI, and thus proved susceptible.
 3. Animal No. XXXIX, Boer kapater goat. Received Cape Town stable June 12th. Infested June 15th with Bont nymphs dropped by XVIII, as larvæ between morning of April 9th and morning of 10th, when the rise of temperature was beginning. (It is difficult to place exact time the fever began in XVIII as her temperature was erratic ordinarily, but the reading for April 9th p.m. was 104.6°, for following morning 103.7°, and for the evening 106.1°. She died during the night of the 11th.) Ten fed and were recovered. No rise of temperature taking place more ticks of the same lot were applied July 8th and of these fourteen were recovered after feeding. Still no indication of illness appeared, and after being used for other experiments the animal was inoculated November 4th with virulent blood and thus destroyed.
 4. Animal No. XXXVII, Boer ewe goat. Received at Cape Town stable on June 12th. Infested on June 17th with Bont nymphs dropped by recovered goat 663 on April 10th just as its temperature was rising from the application of pathogenic ticks. Six recovered. No fever resulted and later shown susceptible in D series by the application of pathogenic adults.

These experiments show that ticks dropped practically up to the beginning of the fever are harmless. But ticks that have dropped during the first day of fever have been found pathogenic, and it is probable that most animals are ill for a day or more in a flock before their condition is discovered. At my suggestion the Veterinary Department tested blood drawn during the period of incubation. Mr. Spreull did the work and found that 5 c.c. of blood drawn full twenty-four hours before the thermometer showed fever conveyed a fatal case when injected intravenously. Ten c.c. of blood drawn the previous day and injected intravenously into another animal proved innocuous.

P. BONT TICK MALES TRANSFERRED FROM A SICK TO A SUSCEPTIBLE ANIMAL SEEM INNOCUOUS.—The following experiment appears to indicate that the Bont Tick plays more than the part of a mere mechanical transmitter of the infection of heartwater.

1. Animal No. XXXIX, Boer kapater goat. Previously used in series O in June, and series M in August and September. Stood next to No. XLV during the latter's fever. On October 9th, after XLV had been in high fever for twenty-four hours, the ticks which were attached to it were pulled off and liberated in a stocking on one of XXXIX's feet. The specimens were all males and were part of the lot which had infected XLV. Many were injured in detaching them but eight succeeded in taking hold, and of these five were still on up to the twelfth day. No fever resulted. Animal proved susceptible in November, through inoculation with blood.

Thus five or more adult ticks taken direct from a fevered animal failed to transmit any infection, a remarkable failure if direct transmission by means of ticks is normal. A single nymph which as a larva fed on a sick animal, it should be recalled, transmitted fatal infection; see A series, case 3.

Q. RED TICKS ARE NON-PATHOGENIC.—All the experiments with the Red Tick have been the testing of adults fed as nymphs on sick

animals. The Red Tick does not drop as a larva, and hence to get engorged nymphs from sick animals hungry larvæ must be applied. The larvæ feed freely only in the ears and need to be liberated in those appendages at least fourteen days before fever is expected. A test with a single goat made in 1899 indicated that the species does not transmit the disease. Another test, with four animals in 1900, left the issue doubtful, for, although no definite fever was produced, abnormal temperatures prevailed after the application of the ticks. The 1901 experiments with the species remove the doubt and tend to show quite clearly that the Red Tick is not a factor in heartwater.

- 1.—Animal No. XL, Boer ewe goat. Received Rosebank stable June 12th. Infested June 15th with Red adults from XXXV when dying May 14th. 22 attached and remained until the 10 females of the number became engorged. No suspicion of fever produced. Removed to Rosedale in August and later proved susceptible through inoculation of virulent blood.
2. Animal No. XLI, Boer ewe goat. Received Rosebank stable June 12th. Infested June 15th with Red adults from XXXV when dying May 14th. 64 attached and remained; 30 females engorged. No suspicion of fever produced. Removed to Rosedale in August and later proved susceptible through inoculation with virulent blood.
3. Animal No. XLII, Boer kapater goat. Received Rosebank stable June 12th. Infested June 15th along with XLI. Only four ticks, all males, attached. No suspicion of fever produced. Removed to Rosedale in August and later proved susceptible to heartwater through inoculation of virulent blood.
4. Animal No. XLIII, Boer kapater goat. Received Rosebank station June 12th. Infested June 15th along with XL. 15 attached. No suspicion of heartwater produced. Removed to Rosedale in August and there proved susceptible when inoculated with virulent blood.

The progeny of the Red Tick when fed on heartwater animals might be tested, but it is highly improbable that heartwater is transmitted in such a way by this tick when it is not by the Ront species.

R. BLUE TICKS ARE NON-PATHOGENIC.—The Blue Tick goes on its host as a larva to stay there until as a male it is exhausted and ready to die, or as a female is replete with blood. Consequently if the species is a factor in heartwater transmission, the infection must pass the egg stage. The females take three weeks or more to arrive at their full growth, and to get specimens fed on heartwater blood proved some trouble. Several times heavily infested animals were given the disease only to die before the ticks were ready to come off, or so quickly when once the fever appeared that one could not be sure the creatures had imbibed infective blood; but finally a number were secured from a dead goat that had been in fever four days.

1. Animal No. XXVII, Boer ewe goat. Received Cape Town stable March 18th. Infested March 27th with several thousand Blue Tick larvæ reared from females taken from X when dying February 12th. Animal was in woefully poor condition and was troubled with diarrhoea. It did not relish the dry forage and was kept alive on grass. After lingering on through all the critical period for heartwater it succumbed to dietetic troubles on April 20th. Many hundreds of engorged females fell from it on the last two days.
2. Animal No. XXVIII, Boer ewe goat. Received Cape Town stable March 18th. Infested March 27th with several thousand Blue Tick larvæ reared from the females taken off X when dying February 12th. Like its mate, XXVII, this

animal ate little and was daily expected to succumb from dietetic troubles. It appeared to suffer also from the heat of the stable and the presence of the ticks. These dropped in hundreds after the 24th day. About March 18th it began to purge, but fortunately it held out until the 24th, quite long enough to show that heartwater had not been transmitted by the ticks.

3. Animal No XLIV, Boer kapater goat. Received Rosedale stable June 10th. Infested August 28th with Blue Tick larvæ reared from a female taken off a dead heartwater goat, May 18th. Very few appeared to attach, and only ten females became engorged. No fever appeared and the animal afterwards proved susceptible.

These tests leave little doubt that the Blue Tick is harmless as regards heartwater; but because two of the animals succumbed so soon after the critical period and the third had so few ticks, the tests are not entirely conclusive and will be repeated during 1902.

S. THE TAMPAN DOES NOT TRANSMIT INFECTION.—The Tampan (*Onithodoros savignyi*, Audouin) is more nearly related to the common Fowl Tick, with which it is sometimes confused under the same name, than with any of the common species of ticks found on stock. Although best known by its attacks on travellers, the Tampan bites sheep and goats freely. It is a tick that is widely distributed in Africa, but I have not heard of it in heartwater sections. Its habit is to engorge itself at once when it is applied to a host, and generally it is on and off again within an hour. After a feed it rests for many weeks or months, and, generally at least, sloughs its skin if immature, or lays eggs if a female, before again seeking an animal.

1. Animal XXXIX when in the height of its fever, November 14th, was infested with Tampans in all stages of development; within half an hour all had become puffed out with imbibed blood. The specimens came from German South West Africa in February, 1900, and hence were very hungry when applied. Although it was summer they did not seem inclined for food again for more than two months. Eight representing both sexes and nymphs of different moults were applied January 29th to LLI, an Angora cross-bred goat previously used in series M tests. All fed, and the critical time has passed without there having been any indication of fever.

It is probable that all blood-sucking parasites other than the Bont and perhaps its close allies are as harmless as the Tampan as far as heartwater is concerned. Dogs have been kept in the goat sheds during the year, and fleas from them have freely gone on to the goats and doubtless have migrated from sick goats to healthy ones. On many occasions numerous flea eggs have been found in the catch cloths of the animals, and flea progeny have often been unintentionally carried through their transformations in the dishes in which ticks were set aside to moult. Lice of two species have been common, and have so swarmed at times that great numbers from sick animals must have wandered on to healthy goats.

SUMMARY OF RESULTS.

The Bont Tick only, so far as has yet been ascertained, is concerned in the natural transmission of heartwater. The Bont Tick, however, is normally as non-infective as other ticks, and it is only

when it has fed on a diseased or convalescent animal that the capacity to infect is acquired. It appears that the infection does not pass through the egg stage of the tick; but it is certain that infection acquired by larvæ may persist and be communicated by adults even when a non-susceptible host, as an ox or a salted sheep or goat, nourishes the intermediate nymphs. A single tick can give rise to the disease in its most fatal form.

LIFE CYCLE AND HABITS OF THE BONT TICK.

To advantageously apply the teachings of the experiments, a knowledge of the life cycle and habits of the Bont Tick is essential. This tick, in common with all the other sorts ordinarily found on stock in this Colony, has four distinct life stages. First it exists as an egg; the egg hatches and there appears the larva or seed tick; the larva gains an animal, feeds and drops to the ground; after a period of rest the larval skin is sloughed and there appears the nymph; the nymph locates on a host, feeds and drops off as did the replete larva; again there is a quiescent interval followed by a second casting of the skin, and the adult appears. The adult male lives to fertilize females; the female finds a host where a male is present, engorges herself, and then falls to the ground wherein or whereon to lay her numerous eggs, of which there may be fifteen thousand or more. The larva is a mere animate speck at first, but swells out into a plump blue-black miniature of an engorged female. The increase in length is from about one-fortieth of an inch to one-twelfth. The larva has only six legs and is thus easily distinguishable from the nymph. The nymph as it finds a host is a flat, brown creature about a twelfth of an inch long, and by its colour, size, flatness and great activity forcibly reminds one of a third grown bed-bug. It increases to about one-fifth of an inch in length by its feeding, but its growth is better told by its increase in weight, which is full thirty-five times; the colour changes to bluish grey. When fully engorged it superficially resembles the common Blue Tick, but it is shorter and proportionately broader, and darker in colour. No method of distinguishing the sexes during the larval and nymphal stages is known. The absence of a genital orifice serves for the easy separation of nymphs from adults in all ticks. The adult Bonts are too well known to require description for those who dwell in heartwater districts; it may be mentioned, however, that engorged female specimens, which measure fully an inch in length and three-quarters of an inch in width and weigh one-tenth of an ounce, are quite common. Probably no other species of tick clings more tenaciously to its host. Often a piece of flesh tears away when a specimen is forcibly removed, and quite as often as otherwise the rostrum is injured. Recently a partly engorged female with a thin line of muscle two and an eighth inches long was received from an East London farmer, who reported that the specimen had been pulled from a festered sore on one of his cows.

The life stages of the Bont Tick are of variable duration, largely dependent upon the degree of heat and hence the season of the year. Development is rapid through the summer and very slow during the winter, and therefore both the tick and heartwater are most common in the warm season. The period from the time the female drops to the time she commences to lay has varied in specimens observed from twelve days in summer to twelve weeks in winter; and the complete period from the dropping of the female to the hatching of the eggs, from eleven weeks in summer to thirty-six weeks through the winter. The time from the dropping of the larva to the appearance of the nymph has varied from twenty-three days to twelve weeks; and from the dropping of the nymph to the appearance of the adult, twenty-seven days to fourteen weeks. These records are for rearings over moist sand in an unusually warm Cape Town office.† In an incubator heated to 87°-92°F., larvæ have moulted in fifteen days and nymphs in twenty; a higher temperature than 95° seemed rather to retard than to hasten development.

The period spent on the host appears to be practically the same summer and winter but differs with different animals and on different parts of the same animal; it generally takes less time, for instance, for specimens to become engorged on an ox than on a sheep or a goat, less time on some goats than on others, and less time on the udder or belly of a goat than on its legs and feet. In general the feeding period of the larva and nymph varies from four and a fourth days to eight days; occasionally on the legs and feet of a goat it is lengthened upwards to twenty-five days. The period spent by the female appears to depend very much upon the virility of the male with which she mates; if he is a worn and feeble specimen she may stay several weeks, but ordinarily she stays about eight days on an ox and nine to ten on a goat. The male remains on indefinitely. Large numbers have been observed to remain upwards of fifteen weeks; a single one which attached to a cow on October 2nd, 1899, was still on in the same position on September 22nd, 1900, when the cow was sold and sent away. It had no mates.

The period through which the Bont Tick may survive whilst awaiting a host seems longer in winter than in summer. In the cool months larvæ have been kept seven months without food, nymphs six months and adults six and one-half months; only a few of large numbers, however, have remained alive for so long. In series B of the experiments is mentioned a case of fever produced by ticks that moulted in July and were applied in January of the following year. The larvæ mount grass or bushes and await the passing of animals. Nymphs and adults hide in the ground, sometimes out of sight in loose dirt or in holes; the presence of animals near by attracts their attention in some undetermined manner and causes them to run actively about in search of the desired prey.

At least one year is probably required for a complete life cycle even when little time is lost in finding a host, and it is quite likely

that two years is often occupied, whilst even so lengthy a cycle as two years and a half is not impossible. The warmer the locality and the more abundant the stock, the shorter becomes the period.

Some kinds of ticks (as the common Dog Tick, *Hemaphysalis leachi*) desert their host on its death, but it seems unusual for the Bont Tick to exercise this means of possibly saving its life; it generally remains on the skin and there perishes. An odd male occasionally wanders off, and, naturally, all such individuals which as larvæ, nymphs or adults have practically finished feeding or only just begun also loosen their hold and crawl away.

DEDUCTIONS FROM THE KNOWLEDGE GAINED.

As the transmission of heartwater apparently depends upon a tick, it appears quite certain that its prevalence depends upon the abundance of the species of ticks that can communicate it. That the Blue Tick, the Red Tick, and the Tampan all seem wholly incapable of carrying the infection is strongly indicative that kinds of parasites other than ticks are not implicated, and that if any species other than the Bont Tick is concerned it is a close ally. The closest relative to the Bont in the Colony is the Schildpad Tick (*Amblyomma devium* Koch), a species found on snakes and tortoises. Nymphs have been found on goats, but only a few. The next nearest relative is the Bont Leg or Bontepooten Tick (*Hyalomma ægyptium*, Audouin). This is a widespread species that occurs in great numbers in the Willowmore, Aberdeen and other Midland districts. Fourteen attempts to rear its larvæ on goats were made during the past year without a single success, and attempts to infest a cow, a cat, a guinea pig, a dog, a fowl, a tortoise and my own person were also failures. Until we learn how to rear the species, we cannot determine its behaviour towards heartwater. The normal larval host may not be any kind of stock.

But whether or not other kinds of ticks can transmit the disease, the fact remains that the one kind, the Bont, is the principal agent. To suppress this tick on a farm is, I believe, to check the disease; and to prevent its introduction to a farm is to keep the disease away. Farmers in heartwater areas should bestir themselves to learn what measures are of most value in destroying the tick; and farmers just outside of the area should learn to know the tick and see to it that it does not get established on their veld. Horses and cattle that have returned from Bont Tick areas should be examined and every Bont pulled off. Stock purchased at fairs should also be well examined. It is difficult to find larvæ and nymphs, but the adults are conspicuous. It is dangerous to allow males to remain, for males attract females, and whereas clean horses or cattle away four or five days on Bont Tick veld would probably return without a single female, they would bring numerous specimens were a few males present on them at the start. The abundance of the tick on a neighbouring farm should not discourage a farmer from doing his utmost.

to keep his stock clean; it sometimes happens that a wire fence separates a practically clean farm from a badly infested one.

Goats and sheep serve as efficient hosts for the Bont Tick, but my impression is that the multiplication of the pest is almost wholly due to cattle. It is hard to get a stand of nymphs or larvæ on sheep, and nearly all that do bite attach to the legs and feet. Goats are far more freely infested by the early stages. The adults mainly attach to the legs and feet of both sheep and goats, although the bare places back of the shoulders and between the thighs are also favourite places. The adults bite deeply and irritate small stock exceedingly; in consequence the animals bite and scratch the affected parts, thus preventing many of the females from maturing. It was only by keeping the infested legs in stockings that engorged females were secured in the experiments; almost all adults that were not protected were soon rubbed or bitten off. Cattle seem much less sensitive to the ticks and are, besides, less able to free themselves of them. The farmer should remember these facts and avoid, as much as possible, from running small stock on veld where Bont Tick infested cattle are or have been.

The prompt removal and isolation of heartwater animals will serve to minimize the number of cases. To get the best results the flocks and herds should be watched attentively and the animals that look the least ill should be removed from the others at once and kept where ticks that drop from them will have little or no chance of subsequently getting on animals susceptible to the disease. One or more small quarantine paddocks might with advantage be arranged near the homestead. Animals that recover should not be allowed to mingle with susceptible ones or even to cross the veld used by the latter until they have been well at least a month.

Some farmers bring sick animals into sheds where they keep rams. There is danger to the rams in this practice, for larvæ or nymphs might drop off in the sheds and after moulting wander to the ram pens. As a matter of fact the danger is little because there are usually large numbers of fowls about the sheds and yards on the look-out for dainty morsels like engorged ticks. If quarantine paddocks for sick animals are used, fowls should be encouraged to run there; in fact fowls and tick-eating birds should be encouraged to frequent the kraals and other places where the animals rest.

The experiments show that there is danger of bringing the disease into new veld with stock of all kinds from heartwater areas. This danger lessens with the increase in time between leaving the heartwater area and depasturing the animals on the new veld and is very slight after a week, the ticks capable of carrying the infection having by that time nearly all dropped off. Engorged ticks in all stages of growth are easily injured, and most of those that drop from a herd or a flock when passing along a road are undoubtedly destroyed by being trampled upon. At resting places, the ticks are much more likely to escape.

In the light of the experiments, it is quite reasonable to suppose that heartwater infection can be eliminated from any tract of veld by simply excluding all susceptible animals for a period. To simply eliminate the disease would not be a very great advantage, for as long as the Bont Tick remained in numbers the disease might at any time be re-introduced by a single sick or convalescent animal or by one or more pathogenic specimens of the tick brought perhaps by an ox or a horse, and when introduced would spread with awful rapidity. But it is conceivable that by excluding all animals for a period, both the tick and the disease might be eliminated; and that, then, ordinary care would suffice to prevent either the tick or the disease from becoming again established. In the United States the redwater area is being slowly but surely diminished in extent by the eradication of the tick that transmits the disease. The Chief of the Bureau of Animal Industry in the 1899 report of the Bureau says on this subject:—

“Another line in which progress has been made is in lessening the area of the infected district. Whole counties have been placed above the cattle quarantine line, because the ticks have been destroyed in those counties and the danger of contagion removed. In many other counties the citizens have taken up the task of tick killing and are making rapid progress in freeing their districts from this pest.”

The means used in exterminating the tick, in this case a close ally to our Blue Tick, are not stated in the report, but from other writings it is quite certain that reliance is placed almost wholly upon the starving-out plan.

Field experiments on an extensive scale to determine (one might almost say examples to demonstrate) the feasibility of banishing heartwater and the Bont Tick from any given area are much needed, and the farmers of south-eastern districts are urged to give the matter serious attention. The Government might, justifiably, be asked to conduct the work and bear the expense; but with no session of Parliament in prospect through which funds might be secured, and for other good reasons, it is suggested that farmers might well emulate the example of the American stockmen who are ridding their districts of redwater and its transmitting tick. The farmers' associations in some of the worst heartwater sections, say those in Albany, Alexandria, and the lower parts of Fort Beaufort and Uitenhage districts, might with advantage, I think, form small syndicates amongst their members for purchasing or leasing sites and for defraying the other necessary expenses. The sites selected should be on notoriously bad heartwater veld. They should be securely fenced and efficient means used to prevent any kind of stock or game from getting into them. Each large enclosure might be subdivided into paddocks, and these experimentally stocked in succession with susceptible animals at the expiration of twelve, eighteen, and twenty-four months; if the expense of subdividing were not too great, other paddocks might be left for fifteen and thirty months.

It is recognized that birds and small animals would remain on veld that might be closed and that no control could be exercised over these creatures; also that some bucks and perhaps even larger game might have to remain. For experiments, it would be advisable to use enclosures containing no large wild animals; but in the practical application of the idea to farms in general, I do not think that game will have to be reckoned with as a factor of importance. As far as I have learned the Bont Tick is rarely seen on bucks of any kind even in badly infested areas except on old, emaciated animals, and I have not heard of its being taken from hares. The common tick that infests tortoises is a distinct species. Some farmers think that locusts often carry the young ticks from one farm to another, and while one can imagine that a few ticks may at times be transported for some distance by winged locusts incidental to their migrations, the chances, it seems to me, are very much against clean veld becoming infested in such a manner.

THE METRIC SYSTEM.

In connection with the paper published in the last issue we may add that as far back as 1864 an Act was passed in the British Parliament making metric weights and measures legal. Four years afterwards in a thin House a Bill to render metrics compulsory was read a second time by a majority of 219 to 57. The matter was then shelved on the Government asking for time to await the report of a Royal Commission then sitting on the currency question. The list of members of the present British House of Commons who have notified their approval of the *compulsory* adoption of metric weights and measures now amounts to a total of 260 (Decimal Association). It may thus be anticipated that before long the subject will command a majority in the House. The Associated Chambers of Commerce of the United Kingdom have presented petitions to Parliament in favour of the metric system, and have quite recently passed a resolution in favour of its compulsory adoption. The British Association for the Advancement of Science and the International Statistical Congress have passed resolutions recommending the general adoption of the metric system.

Cassell states that up to 1899 four hundred million people were using the metric system.

The following table from the Imperial Institute Journal of July 1902 is one of the most convenient for ready reference in working with metrical and common weights and measures :—

METRICAL WEIGHTS AND MEASURES.

TABLES FOR CONVERTING METRICAL WEIGHTS AND MEASURES.

			SQUARE					
HECTARE.		ACRE.	KILOMETRE.		ENG. MILE.	KILOMETRE.		ENG. MILE.
0.405	1	2.471	1.609	1	0.621	2.592	1	0.886
0.809	2	4.942	3.219	2	1.243	5.184	2	0.772
1.214	3	7.413	4.828	3	1.864	7.776	3	1.158
1.619	4	9.885	6.438	4	2.486	10.368	4	1.544
2.023	5	12.356	8.047	5	3.107	12.960	5	1.930
2.428	6	14.827	9.656	6	3.728	15.552	6	2.316
2.833	7	17.298	11.265	7	4.350	18.144	7	2.702
3.237	8	19.769	12.879	8	4.971	20.736	8	3.088
3.642	9	22.240	14.484	9	5.592	23.328	9	3.474
4.047	10	24.711	16.093	10	6.214	25.920	10	3.860
8.098	20	49.423	32.186	20	12.428	51.840	20	7.720
12.140	30	74.134	48.279	30	18.641	77.760	30	11.580
16.187	40	98.846	64.373	40	24.855	103.680	40	15.440
20.234	50	123.557	80.466	50	31.069	129.600	50	19.300
24.286	60	148.268	96.559	60	37.283	155.520	60	23.160
28.327	70	172.980	112.652	70	43.497	181.440	70	27.020
32.373	80	197.692	128.746	80	49.710	207.360	80	30.880
36.420	90	222.903	144.839	90	55.924	233.280	90	34.740
40.467	100	247.114	160.932	100	62.138	259.200	100	38.601

METRE.		YARD.	KILOGRAMME.		LB. AVOIR.	LITRE.		GALLONS.
0.914	1	1.094	0.454	1	2.20	4.54	1	0.22
1.829	2	2.187	0.907	2	4.41	9.09	2	0.44
2.743	3	3.281	1.361	3	6.61	13.63	3	0.66
3.658	4	4.374	1.814	4	8.82	18.17	4	0.68
4.572	5	5.468	2.268	5	11.02	22.72	5	1.10
5.486	6	6.562	2.722	6	13.23	27.26	6	1.32
6.401	7	7.655	3.175	7	15.43	31.80	7	1.54
7.315	8	8.749	3.629	8	17.64	36.35	8	1.76
8.229	9	9.843	4.082	9	19.84	40.89	9	1.98
9.144	10	10.936	4.536	10	22.05	45.43	10	2.20
18.288	20	21.873	9.072	20	44.09	90.87	20	4.40
27.432	30	32.809	13.608	30	66.14	136.30	30	6.60
36.576	40	43.745	18.144	40	88.18	181.74	40	8.80
45.719	50	54.682	22.679	50	110.23	227.17	50	11.00
54.863	60	65.618	27.215	60	132.28	272.61	60	13.20
64.007	70	76.554	31.752	70	154.32	318.04	70	15.40
73.151	80	87.491	36.288	80	176.37	363.48	80	17.60
82.295	90	98.427	40.823	90	198.42	408.91	90	19.80
91.438	100	109.863	45.359	100	220.46	454.35	100	22.01

For the use of these tables the following explanation is necessary :—The figures in heavier type represent either of the columns beside it, as the case may be; *viz.*, with hectares and acres in the first set of columns, 1 acre=0.405 hectare, and vice versa, 1 hectare=2.471 acres, and so on.

THE PLAGUE OF TICKS.

Their Destruction by Oil Spraying.

Eastern Province Experiments.

By MR. C. P. LOUNSBURY, Govt. Entomologist.

Tick destruction has become a stock farming problem of considerable importance in South Africa. Everywhere in the country ticks are more or less of a pest and in many sections they are a veritable plague. The south-eastern and eastern seaboard is the most afflicted part of the Cape Colony, but stock often suffer severely in southern and south-western districts and even in portions of the Karroo. Year by year the evil has been increasing, in some places slowly, in others rapidly. A prominent Willowmore farmer recently told the writer that ticks were no trouble at all in his locality five years ago, whilst now the Bont Leg species is so injurious to his stock that he fears he will be driven out of sheep farming by it.

Various remedies are employed in the Colony to destroy ticks, but most are used in a more or less haphazard manner with little attempt at system or thoroughness. I am told that many natives practice greasing their cattle, and that at some kraals hogs are reared chiefly to furnish fat for the purpose. Tick clipping with scissors, leaving the parasites to dry out on the skin or to drop off as may chance to follow, is a common resort along the coast. One old pioneer of the East London district writes that he pays his native herdsmen to collect female Bont ticks from his cattle, giving them 3d. for each fill of a half pound jam tin. In this way he estimated to have obtained between two and three bushels of ticks last year. A great many farmers now spray or hand dress with one or another of the numerous carbolic and arsenical sheep dips at a heavy expense for materials and labour, and unfortunately, through ignorance of the habits of the ticks, most of these men grossly over-estimate the value of their applications.

INCIDENTAL EVILS FROM TICKS.

There are many distinct kinds of ticks on stock in the Colony, and aside from the direct injury the various kinds do in draining off the blood of their hosts, some sorts transmit disease. The common Blue Tick is no doubt the usual if not the sole agent in the spread of

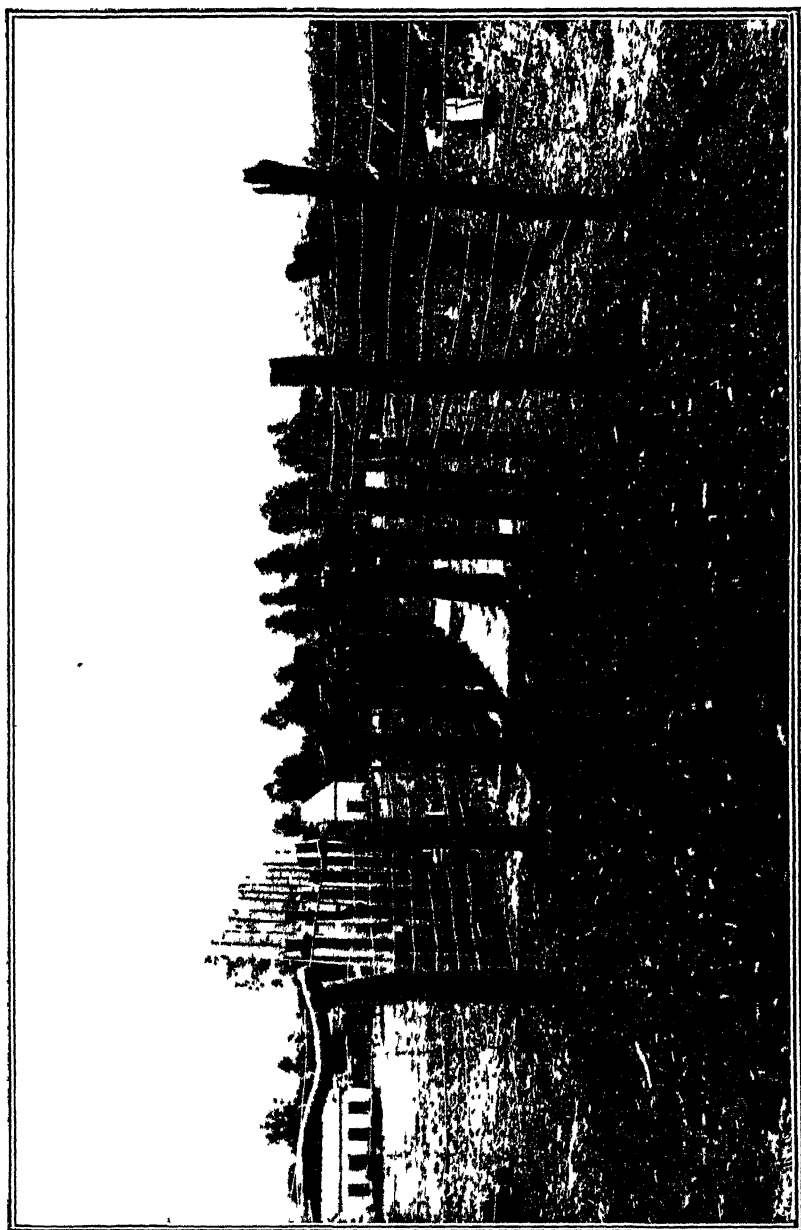
redwater; the Bont Tick spreads heartwater; and the Dog Tick spreads malignant jaundice or what is more commonly though wrongly called distemper. Probably other diseases are similarly disseminated, and not only diseases but putrefactive organisms that give rise to open sores that seriously affect the health of stock. One small tick, a species of *Ixodes*, is considered by many observant farmers to be responsible for a form of paralysis in sheep common in several eastern districts; and much lameness in stock, both large and small, is directly due to deep biting ticks like the Bont Leg and the Bont.

Of all the various ticks probably none is so pernicious in its effects as the Bont Tick (*Amblyomma hebraeum*), and it is against this species that most attempts at tick destruction in Cape Colony have been specially directed. This tick is very abundant along the Fish River Rand in the northern part of the Albany district. It was here that the first really systematic and intelligently directed efforts at tick destruction in South Africa, of which I am aware, were begun. The man who instituted this work was the Hon. Arthur Douglass, M.L.A., and the remedy he adopted and still faithfully follows is

PARAFFINE OIL SPRAYING.

For many years ticks had been getting steadily worse on Heatherton Towers, Mr. Douglass's property, and along in 1896 he concluded that he must manage to suppress the pest or soon cease cattle farming. The various dressings that were and are still more or less used by others were tested and one by one discarded as inefficient. A dipping vat was constructed and some dipping tests made, but various circumstances led to the abandonment of dipping in favour of spraying. His efforts to find a successful wash were finally rewarded by his demonstration that paraffine oil, the ordinary illuminating oil found in every household, answered the requirements. Other colonial farmers had used paraffine against ticks, but when put on with a sponge or cloth as was usual, it was less effectual against ticks and burned the skin of the animals. In America, too, paraffine had for several years been employed as a cattle spray, but Mr. Douglass did not know of this, and the fact should not detract from the credit given to him. His delight at the discovery was unbounded, and with characteristic enthusiasm he issued an invitation early in 1898 to all and sundry interested to visit his farm on an appointed day to witness a practical exposition of tick killing by the newly found agent. The value of the demonstration was not wholly the bringing forward of oil as a spraying material, for of almost equal importance was the exhibition of how a wash could be economically and quickly applied by having the cattle being treated enclosed in a narrow passage between two fences.

A large number of farmers attended the demonstration, and by them and the newspaper reporters a knowledge of the remedy was quickly disseminated throughout the surrounding country. Many



THE DOUGLASS CATTLE RACE FROM BEHIND.

farmers have begun to follow his example, but not nearly the number that should do so or that would have done so had it not been for the troublous times through which the Colony has but just emerged. Now we may expect a more general crusade against ticks, and hence it is a most fitting time for the review of this oil remedy. The first requisite when many cattle are to be sprayed is the passage in which to enclose them. This is called the "race." Two races are shown in our illustrations, the one at Heatherton Towers and the one at Cottesbrook, Adelaide, Mr. L. J. Roberts' farm.

THE DOUGLASS RACE

is a passage twenty-three feet long and two feet wide between wires. It accommodates three adult cattle at a time. The posts for the sides are set about six feet apart and are bedded in cement. They are strung with eight horizontal size No. 6 wires stayed with three ties of doubled No. 8 wire between each two posts. The top wire is five feet from the ground. The floor is made nine inches to a foot thick and is finished with cement mixed with good sand in the proportion of one to three. It is depressed along the middle and slopes towards one end, where it drains into a cemented hole at the side. To enable the men to better spray the under side of the animals, a trench about two feet wide and nearly as deep extends along each side close to the fence; therein the men crouch who handle the spraying nozzles. A heavy swing gate closes the end of the race when cattle are enclosed, and long poles inserted on the wires are placed between the cattle to hold them apart. The high iron fence at one side of the race shown in the illustration was erected as a breakwind that heavy winds might not interfere with the work.

THE ROBERTS RACE

was built much later than the Douglass Race and naturally embodies some improvements. In fact, Mr. Roberts first built a temporary race in close accordance with the Douglass specifications, and erected his present substantial one after he had gained sufficient experience with the first to know just what was wanted. The race is built in his calf kraal against the front of his long calf shed, the supporting posts of which are utilized so far as they are in place. In extreme length, that is from the front of the first post to the back of the last, it measures twenty-one feet. Three cattle at a time are accommodated. The front beast is allowed three inches short of eight feet in which to stand, and the second and third beasts each six and one half feet. There are eight posts in all on each side. These are not spaced quite uniformly but so as to have one close behind each animal as it stands in place and others intermediate. There is a single intermediate one in the hind and middle sections and two in the longer front section. The nearness of the posts to one another obviates the necessity for wire lacings. They stand five

feet high and are connected by a beam of heavy native wood, about two inches by six, which extends along their tops outside. This beam is bolted in place and forms an efficient brace. Three feet and three inches above the floor, that is mid-flank high on an ox, a gas-pipe of one and one-half inch diameter extends along the sides of the race on the inside of the posts, the posts being cut away slightly to receive it. Between the floor and the gas-pipe are four heavy wires (the lowest is missing in the illustration) and between the gas-pipe and the brace above is another. I believe Mr. Roberts later decided that there should be two above the gas-pipe, but only one was up when I last visited the place. The wires are let through the posts as is usual in South African fencing.

The width of the race between the two lines of gas-pipe is twenty-four inches, which is just wide enough to take the largest ox on the farm. The front of the race has a "Roberts' patent gas-pipe gate" about three feet wide by five feet high. The floor consists of set stones covered with two to three inches of cement, and like the Douglass it is graded to drain down the middle and into a cement-lined excavation at one side. The cover to the hole may be seen in the illustration of the empty race near the bottom on the right. A hard floor is a necessity. A soft floor quickly becomes a quagmire, and even a cement one soon becomes fouled during spraying by the accumulation of dung, urine and dripping spray.

The animals are kept separate in the race by short poles passed between them through wire loops in front of the posts. The loops can be plainly seen in the illustration showing horses in the race. No poles were inserted on this occasion. The animals naturally press forward and the back beasts get their heads over the separating poles. The front one is held back by the gate, and hence the reason for making its section of the race longer than the others. Behind the race proper is the

CRUSH YARD,

which leads from the kraal. This yard has strong side fences that converge towards the race, as may be seen in the illustrations taken from behind. A dozen or more cattle, as may be convenient, are driven into the crush from the kraal, and then as they are wanted they are urged along into the race. From the front of the race, the exit is into a camp.

HORSES AND MULES

are passed through the race and are sprayed just as are cattle by both Douglass and Roberts. The latter keeps no sheep and the former only two or three hundred, which are hand dressed. The ostriches at Heatherton Towers are, however, sprayed with oil and water for the Ostrich Fly (*Hippobosca struthionis*) and lice, but not for ticks, of which the birds are able to keep themselves fairly free.



SPRAYING CALVES IN THE DOUGLASS RACE

THE FIRST TIME

animals are driven into a race they are apt to go very unwillingly, and when once in may make violent exertions to jump over the front or sides or to crawl out beneath. A heavy hard-wood gate on the Cottesbrook race was quickly smashed by a vicious ox, but though the gas-pipe one has been charged and jumped on times without number it has resisted every strain without being injured. The race gate should be kept open when the animals are driven in until the foremost is in his place, and then it should be quickly shut in his face and a pole put back of him before he can retreat. After having been sprayed a few times, however, there is little trouble in urging the animals on, the wildest of them generally moving quietly forward in their turn as if conscious of the benefits of the treatment.

Some farmers do not use a race in spraying but tether their cattle to posts in the kraal instead. When only a few tame cattle are concerned this procedure is not a bad one, but it is cruel and exceedingly laborious when a large lot of half wild cattle have to be handled. Milch cows that are stabled (as few are outside the towns at the Cape) may be sprayed in their stalls, but they should be turned out immediately afterwards.

THE TIME REQUIRED

to spray cattle in a race after the men and animals have become accustomed to the routine averages about a minute a head. Sixty animals an hour are ordinarily handled at both Heatherton Towers and Cottesbrook with sprayers working simultaneously on the two sides of the race. Seventy-five to one hundred animals can be hustled through, but the first requisite of cattle spraying is thoroughness, and to maintain thoroughness the men at the nozzles must not be unduly rushed.

Five or six men are needed for the work, one or two at the pump or pumps, one on each side to spray, one behind to drive, and one to attend the forward gate. The most trustworthy men should be at the nozzles, for the ticks that are not hit by the spray will continue to live. The animals are not sprayed all over.

ONLY THE UNDER AND REAR PARTS,

the dewlap, tail, feet and legs are generally sprayed, for few adult Bont ticks are found elsewhere. The men keep a sharp look-out, however, and wet down any that chance to be high on the flanks, and may spray the whole body if the Blue Tick is abundant. Bont ticks on the sides and back and along the tail are more common amongst sprayed cattle than unsprayed. This is because males that get in these unusual positions may be overlooked in spraying, and, the other males being killed, the females search farther in quest of mates, thus finding those in the exceptional places which ordinarily are quite overlooked.

MIXED OIL AND WATER

soon superseded the use of pure oil, and for the application of the two liquids together specially fitted pumps are necessary. Mr. Douglass was using pure oil when the photographs here given of his race were taken, and hence the pump shown is a simple one. At that time his race had an extension to hold three cattle after spraying, that the oil dripping from them might be saved; but with the use of diluted oil it became of small advantage to save the extra drip and the extension was removed. Mr. Douglass uses two "Douglass Patent Syphon Pumps" for his spraying, whilst Mr. Roberts has one large pump that he fitted up himself; it delivers two streams, one of which is led through an iron pipe laid under the race for the supply of the hose on the farther side.

There are several makes of oil-water pumps, and in the next issue of the *Journal* all the important ones will be discussed and several of them illustrated; therefore the pump phase of the problem will be omitted from this article.

Mr. Douglass has his pumps set to supply twenty-five per cent. of oil. Mr. Roberts sets his at twenty per cent. Experiments which Mr. Roberts and the writer conducted showed that fifteen per cent. mixture well applied was fatal to the ticks, but no pump always works perfectly true to its gauge and hence some allowance is necessary.

THE QUANTITY OF OIL

used at Heatherton Towers approximates ten gallons to one hundred head of mixed cattle, and at Cottesbrook the average is a trifle higher, being about ten and two-thirds gallons. Ten gallons in a twenty per cent. mixture for one hundred cattle averages a half gallon of liquid to a beast. The amount of oil recovered from the drain holes is usually from five to ten per cent. of the total used. Mr. Douglass has all the drainings poured into a large tank and has all the oil skimmed off after twenty-four hours. Mr. Roberts generally boils his before skimming and thinks he saves by the method.

THE INTERVAL BETWEEN SPRAYINGS

is made fourteen days at Heatherton Towers and twelve days at Cottesbrook. Mr. Douglass at first thought one spraying a month would do, but soon found the interval too long and reduced it to nineteen days. The idea is to spray sufficiently often to prevent any female Bont ticks from maturing. In 1899 the writer traced the life cycle of the Bont Tick and found that the female took six and one-half days or longer to fill up on an ox. Few were found to fall until eight days had passed. It so happens, fortunately, that a female rarely attaches except by a male that has been on several days, and that when one does attach elsewhere its development is very slow until after it has contrived to mate. No observed males have become attrac-



THE ROBERTS CATTLE RACE FROM BEHIND

tive until they have been on four days, and few have attracted until they have been on five or six. Therefore the period after a thorough spraying during which no female can mature may be calculated as twelve days, which allows for a male attaching the day of spraying and of becoming ready for company on the fifth day, and for a female then at once finding this male and becoming ready to drop on the last day. It seems unlikely that any females will actually fill up in the minimum time, particularly as one would imagine the presence of the oil to have a deterrent effect for a day or more, and it was thought quite safe to make the interval between sprayings an even fortnight. Mr. Douglass adopted this interval soon after the tick studies were published and seems still satisfied that it is short enough. Mr. Roberts, however, after two years' experience, fears a few females are permitted to mature and has now cut off the two extra days. It must be remembered that if any Bont males escape a spraying, new females may mate with them at once and perhaps be matured in seven or eight days; the necessity for very thorough spraying is thereby emphasized.

The common Blue Tick stays on an animal three weeks or more; very few specimens indeed come off under twenty-three days. Hence the complete destruction of all that come on the animals once in three weeks should prevent any of this species from fully maturing. The females of the Red Tick, the species found clustered about the anus and genitals, may go on coincidentally with males and drop off six days later fully engorged, and hence dressings for it would have to be at least every six days to be most effectual; but, fortunately, this species is not one that requires repressive measures. It spends a fortnight or more in the ears of animals in its early stages, and could there be destroyed at longer intervals were it not that syringing ears with paraffine is too harmful a measure to warrant adoption.

THE EFFECT OF OIL SPRAY ON THE TICKS

begins to be apparent almost at once, and in an hour after spraying most of the victims are dead. On the next day many are already dry and easily break off. Engorged female Blues become shrivelled, blackened and hard, and look as if they had been parched. It is not easy to determine the full effect until after twenty-four hours, so judgment on the success of a spraying should be suspended for that length of time.

The Bont Tick is as quickly destroyed by the spraying as any other kind. The Red Tick is the most likely to escape, as the skin where it prefers to attach is devoid of hair and the spray therefore fails to remain. The Blue Tick when actively feeding is almost certain to die; but when it is hanging dormant waiting for a change of skin it stands a good chance of escaping. The Blue is the only species of tick that we have that always remains on the animal at such times. The efficacy of the spray largely depends on its being held on the animal in contact with the ticks for a short space of

time. It is the oil on the hair rather than that on the skin that does the killing. Oil rubbed on with a cloth is apt to burn the skin and yet not kill all the ticks, for the hairs get little of it. But an oil spray should be fairly hard, hard enough to drive against the skin, or the bases of the hairs will not be wetted and many young ticks close against the skin will escape. The Bont Tick will often survive a momentary immersion in pure paraffine, and this anomaly has made some people doubt the efficacy of spraying; but they have only to try spraying once to discover how differently the spray acts to the momentary dipping.

THE EFFECTS OF OIL SPRAYING ON THE ANIMALS

is generally not injurious in any respect. In hot, dry weather the oil soon evaporates without causing any damage to the skin, even when sprayed on undiluted. When cool, cloudy weather prevails, or when the spraying is done late in the day, a slight inflammation of sensitive skin may result however much or little oil is used, but this injury is rarely enough to cause any suffering. Those who spray naturally take reasonable precautions to avoid injuring the animals. As far as can be arranged, the spraying is done early on fine days, and stabled animals are allowed to dry before they are again put under cover.

The oil-water mixture seems far less apt to inflame the skin than paraffine emulsion, that is the milky mixture formed by churning paraffine in strong soap and water, and the simple mixture is more destructive to the ticks.

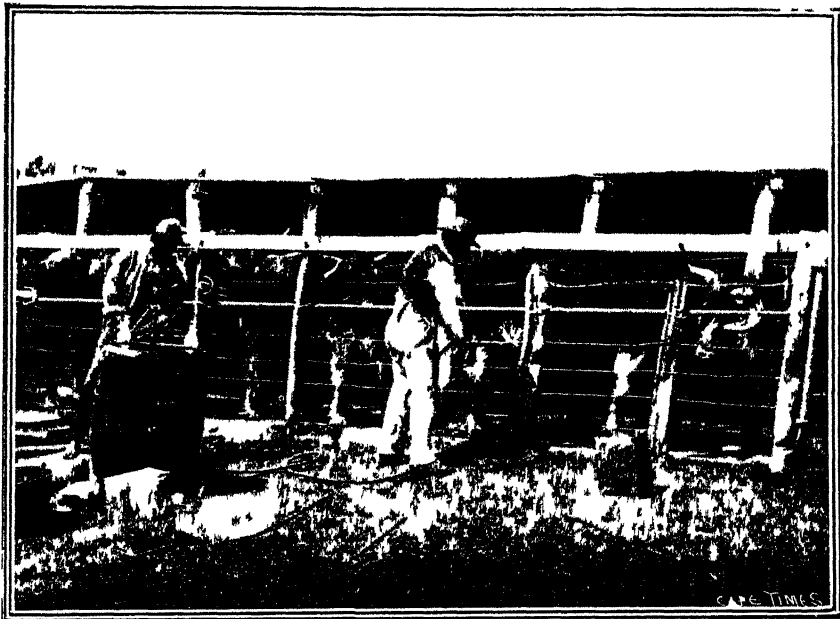
As ticks have decreased on their farms both Mr. Douglass and Mr. Roberts have

CEASED TO SPRAY IN THE WINTER.

Mr. A. W. Douglass, son of the Hon. Arthur Douglass, who is now farming Heatherton Towers, sprays during eight months only, September to April inclusive. He says very few ticks are now seen on the cattle during the winter. Mr. Roberts has his cattle brought up to the race at the regular periods and simply hand smears the few ticks found on them. Three years ago the Bont Tick was numerous on his cattle all through the winter, and many of them were studded all over with the Blue species even in July.

HOW LONG MUST SPRAYING BE CONTINUED?

No strict time limit can be put. The chances are that the remedy as practised by Mr. Douglass will be needed, without any relaxation, at least through the summer months, for all of three years and perhaps five. After one season of faithful spraying, a decided improvement will be evident; but even after five years it is probable that several sprayings every season will be necessary, and necessary indefinitely thereafter, to keep the pest well suppressed.



SPRAYING CATTLE IN THE ROBERTS RACE.



SPRAYING HORSES IN THE ROBERTS RACE

Spraying has been practised as regularly as conditions permitted for four years at Heatherton Towers, and there was still a fair sprinkling of ticks, I am told, on the cattle last summer; but the improvement over five years ago is said to be immense. In a recent letter from there I am told that the stock now prosper as they have never done before. The heifers almost invariably come up after calving with all their teats; and sore udders, so much in evidence on farms badly infested with the Bont Tick, are a thing of the past at Heatherton. The reduction of the pest, in Mr. Douglass's estimation, has added £2,000 to £3,000 to the value of the estate, and he thinks many hundreds of thousands of pounds would be added to the value of the coast farms in his part of the Colony were only oil spraying generally adopted. With the suppression of ticks, he and many others implicitly believe that sheep farming, and consequent great prosperity, would extend again right down to the coast.

A farm near Heatherton Towers, worked by another son of the Hon. Arthur Douglass, has likewise been almost cleaned of ticks. Spraying has been carried on there for three years. It used to be almost as lively a spot for ticks as exists anywhere, and I became most painfully aware of the infestation by a brief visit. Young Bont ticks do not respect entomologists.

Much better results than have been obtained at the farms mentioned may be confidently expected by farmers who now take up the spraying and pursue it thoroughly. The last two or three years have been too full of more serious work for the few who have sprayed for them to get the most out of the measure. For months at a stretch during the invasion the men had to be on military duty, and the spraying when not altogether neglected had to be left without proper supervision.

When spraying becomes more general and as more experience is acquired, it is likely that the present routine will be varied and improved upon. I fancy, myself, that a weekly spraying from the middle of December to the middle of April, say eighteen sprayings in all, will reduce the ticks much more quickly than spraying every other week throughout the year. Far more larvæ and nymphal Bont ticks, stages which remain on only about six days, would then be destroyed. But it has yet to be demonstrated that the cattle will stand a weekly treatment. If they are harmed by it, it may be open to proof that a weekly spraying for eight months in the year will almost clear out the ticks in two years' time. What is now wanted is that the remedy be taken up and pushed. It is certainly worth it.

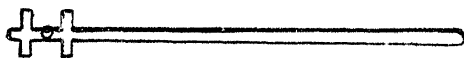
SHEEP'S MILK CHEESE.

An Italian Rural Industry

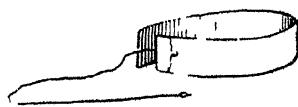
The Making of Pecorino, or Ewe's Milk Cheese.

BY MRS. M. L. MILNE.

Wherever sheep are kept in Italy cheese is made from their milk. There are several qualities of sheep's milk cheese. One of these, the kind made in Tuscany, is called "pecorino Toscano," and its making is easy and simple. As a rule, in Italy, the shepherd milks the ewes both morning and evening; his wife or daughter, who is called the shepherdess, makes the cheese, and her utensils are of the simplest description, viz :—A large metal pot, a fine sieve, a wide and deep earthenware basin, a wooden stick with a few projecting bars at one end called the "frulla," and a mould made of a strip of wood with a cross bar at one end to which a string is attached, and which is called the "cacine." These are all that are required.



FRULLA.



CACINI.

Rennet is only used in making a coarse and strong quality of cheese, and in all the finer kinds the dried flowers of *Cynara Cardunculus*, a plant nearly related to the garden artichoke, are preferred to curdle the milk. It has a great bossy head like a huge thistle. The flowers are allowed to dry on the plant until the fine purple florets can be easily picked out. These florets are then spread on a cloth to be thoroughly dried, are then hung up in a bag, and if kept in a dry place remain good for an indefinite length of time. When ready for use they are called the "presura." In Italy lambs are generally left with the ewes for one month. During this time the ewes are not milked. When the lambs are one month old they are sold, and then the ewes are milked both morning and evening for a space of four or five months, and the whole of their milk is made into cheese. In flocks where lambs are born twice a year, the ewes are only milked one month. From a flock of 80 ewes, about six hundred and fifty to seven hundred lbs. of cheese can be made in one season. The cheeses are sold wholesale to the shops at 3d. to 4½d. per pound, and are retailed at 8d. or 9d. per pound.

The usual method of

MAKING PECORINO TOSCANO

is this. The shepherdess takes a small quantity of *presura*, rubs it with her hands in half a tumbler of water, and allows it to soak in the water for a couple of minutes. If the milk is still warm from the ewes, it does not require to be heated, but if cold it is placed near a fire, in a large metal pot, until it reaches the warmth of new milk. The water in which the *presura* has been soaked is then poured through a fine sieve into the milk. The milk is left in a warm but not *hot* place, and it becomes curd in from twenty to thirty-five minutes. As soon as the curd is firm, it is broken into very minute particles, by being well stirred backwards and forwards, from side to side, and around by means of the *frulla*. The shepherdess then slowly and gently draws the curd together with both her hands, pressing it until it becomes firm enough to be lifted out of the pot and placed in the wooden mould or *cacina*. The *cacina* having been well washed, is drawn into a circular shape by means of the string which is fastened round it, and by tying more loosely or more tightly it serves to make a larger or smaller mould for the cheese. It is next placed in an earthenware basin. The shepherdess, as soon as she has placed the curd in the *cacina*, commences to work and knead it with the outstretched fingers of both hands, which must go almost to the bottom of the curd. This is done steadily but not quickly for almost half an hour. The whey rushes out of the curd, and must from time to time be emptied into some receptacle, until the curd is reduced to half its original size. The top of the cheese is now very carefully pressed and kneaded with the tips of the fingers until the surface is perfectly even. The *cacina* containing the curd is then turned over, and for twenty minutes more the same process of working the curd with outstretched fingers goes on, taking care however not to go deep enough to disturb the smoothed surface which now forms the bottom of the cheese. The curd should by this process be reduced to a quarter of its original size, and its top is finished in the same way as was the bottom, by working and pressing with the tips of the fingers until there is an even surface. It is then thickly sprinkled with salt, and placed, still in the *cacina*, on a board in a cool place. It is not pressed or put under any weight. After twelve hours it is turned, and the bottom of the cheese, which is now uppermost, is thickly sprinkled with salt. It is then left on the board for twelve hours more, when it is removed from the *cacina* and laid on a shelf in a cool place. The cheese is turned once a day for forty days. After that time it is rubbed all over with a very few drops of sweet olive oil, and placed on end in a large terra cotta jar. Every fifteen or twenty days it is again rubbed with oil, but very little must be used. This quality of cheese is very firm, but in the cold weather

A SOFT CHEESE IS MADE

by only slightly breaking the curd with the frulla so that it is left in large flakes. When put into the cacina, only the top and bottom of the curd is worked and pressed with the tips of the fingers, leaving a central stratum untouched. The cheese is then salted, and turned in the same way as the harder kind. After fifteen days it may be cut, as it is then at its best. The inside will be found to present the consistency of very thick cream. Both kinds of cheese must be made of perfectly sweet milk, but the evening's milk may be mixed with that of the morning if both are sweet. Twenty sheep can be milked in half an hour.

"RICOTTA"

is made in this way. The whey that is left after the pecorino is made, is strained through a fine sieve to remove every particle of curd. It is then poured into a metal pot, and is placed on a slow fire. After the whey boils, it is allowed to simmer for five or six minutes, when all the white substance in the whey forms itself into ricotta. The shepherdess skims off the froth which rises to the surface, then draws the ricotta together and removes it from the whey with a flat drainer. It is heaped into a mass and allowed to drain, without being worked or pressed in any way, and it can be eaten as soon as it is cold. It is only good on the day it is made. Ricotta is a favourite dish in Italy, and it often takes the place of butter, being spread on bread. It is eaten with salt, sugar or honey; mixed with spinach it is used as a vegetable, and in the South of Italy it is made into all kinds of sweet dishes.

From the whey that is left after making two pounds of pecorino, half a pound of ricotta can be made.

In regard to the use of substitutes for wool the *American Wool and Cotton Reporter* says: There is undoubtedly less wool in the United States than there was a year ago. It is a settled fact that the next Australasian yield will be light. It is true that prices are firm in London. It is also true that the strike in the American Wool Company's mills is diminishing. All these are "bull factors" in wool. As opposed to all these factors is the simple fact that when wool goes above 50 cents clean the use of substitutes increases rapidly. That is to say, such has been the rule of late years. Whether that rule will hold in the future no one can, of course, say.

Return of Fruit Exported

DURING THE MONTHS OF JULY AND AUGUST, 1902.

Port.	Variety of Fruit.	No. of Packages.	Quantity.	Declared Value.		
Capetown.	Oranges ...	3	150	£	s.	d.
	Naartjes ...	34	2,040	1	0	0
	Pine Apples	1	12	22	0	0
				0	10	0
	Total ...	38	2,202	£23	10	0

PATENT BOX-CLOSING DEVICE.

Sir Charles Elliott, late General Manager of the Cape Government Railways, who is always on the look-out for innovations that may be advantageously introduced into the Colony, recently directed the attention of his successor to a simple and ingenious device that appears to be largely used in the United Kingdom for fastening on the lids of "home trade packing cases." The use of the device renders a case much more lasting than otherwise; and as, owing to the wood having to be imported, boxes are expensive in this country, it is believed that these patent fastenings will interest shippers who send fruit, butter, eggs and other commodities to market in boxes or cases, large or small, that are to be returned. Through the kindness of the Railway authorities this Department has been favoured with a copy of Sir Charles's letter, and the loan of a model box fitted with a set of the fastenings.

The accompanying illustration will assist in explaining the details of the device. There are eight pieces to each set of fittings, two of each of the four kinds shown. The two No. 1s, one on each side, are screwed to the front of the case, each with its projecting top let flush into the upper edge of the wood. The lid is then laid in place and holes cut for the reception of the "locking screws" of the No. 2s, these screwing down into the No. 1s. The No. 2s are then screwed to the lid. Next the No. 3s. are screwed on in line with or parallel to, the No. 2s. on the opposite side of the lid, with their

curved ends projecting over and down. The No. 4s are then hooked onto the No. 3s and screwed against the back of the box. The lid is thus snugly held to the box back and front. To take it off one has only to loosen the locking screws of the No. 2s. and slip them back to release the 3s from the 4s. The locking screws cannot fall out. A view of the back of the model box, and one of the front, with the fittings in place and the lid slightly raised, are given in the illustration.

The pieces are advertised to be made of "unbreakable best wrought iron." They are supplied in four sizes, the smallest of which is the length shown by the figures. This size is recommended for one-quarter to one-half inch wood. The second or medium size is four inches long and is recommended for one-half to three-quarters inch wood. The third or large size is six inches long and is for three-quarters to inch wood. The fourth or extra large size is eight inches long and is intended for very large and heavy cases. The small size is amply large for any ordinary fruit box, and probably for most other cases to which a farmer would apply the device. The makers say the fittings "may be attached to any case, new or old, and will out-wear the timber of many cases." As the use of nails or screws that must be removed to open the cases is entirely obviated, the boxes and particularly the lids must undoubtedly prove much more lasting; the makers say a fitted box will out-last three ordinary nailed boxes. By the testimonials in the descriptive leaflet it appears that one English firm has ordered over a hundred thousand sets.

The use of a screw-driver is necessary to loosen the locking screws. When there is danger of pilfering it is suggested that the tops of these screws be covered with sealing wax or plaster of Paris and be impressed with a seal.

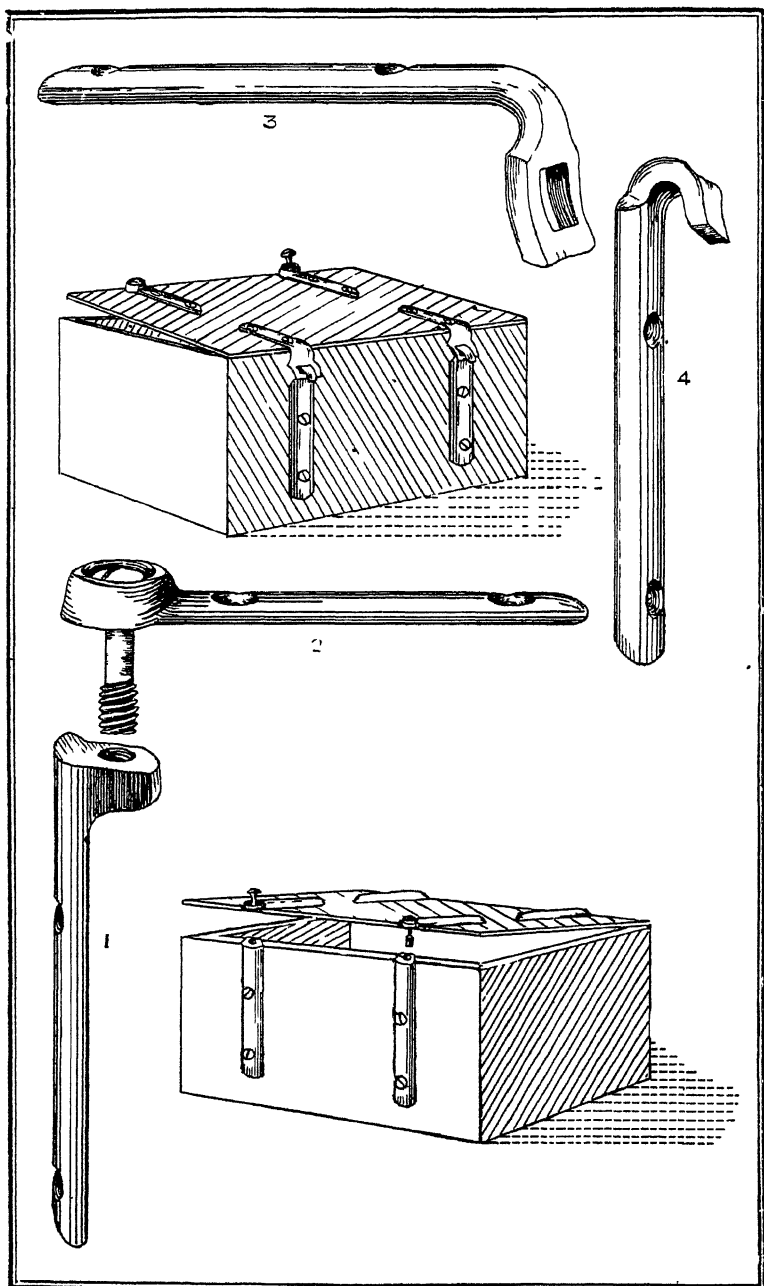
The manufacturers are "The Patent Packing Case Company, Ltd." 34, Ann Street, City, Glasgow, and orders may be sent to them direct. The prices quoted in their leaflet are

Small size	...	...	8s. per dozen.
Medium size	...	...	16s. per dozen.
Large size	...	...	24s. per dozen.

Presumably "per dozen" means per dozen full sets. Carriage is paid in the United Kingdom on orders of £5 and upwards. When a case is worn out the fittings can be transferred to another; and parts lost can be obtained at proportionate prices from the makers.

The Department of Agriculture would like farmers to test the usefulness of the device on their "return empties" of all sorts that seem worth the expense of fitting; and it is notified that as an encouragement the Department will be pleased to act as free agent for an introductory importation. Orders should be sent in at once addressed to the Under Secretary. It is expected that a discount, sufficient to cover the shipping and clearing charges, will be given by the manufacturers.

C. P. L.



BOARD OF HORTICULTURE.

Railway Facilities.

Labour Problem.

Coolies or Italians ?

The quarterly meeting of the Western Province Board of Horticulture was held on September 5th at the offices of the Department of Agriculture, Cape Town. The members present were: Messrs. C. W. H. Kohler, W. van der Byl, Henry Meyers D. de Vos Rabie, M.L.A., P. J. Cillie, C. son, P. J. le Roux, Henry Cloete, P. P. Malleson, Rev. S. J. du Toit, W. A. Krige, C. Mayer (secretary) and C. P. Lounsbury (Government Entomologist).

At the outset the Secretary reported that the Hon. John Frost, Secretary for Agriculture, was unable to attend the meeting owing to the pressure of Parliamentary duties, but that he hoped to be able to attend future meetings of the Board.

Mr. Kohler was accordingly elected to preside.

NETTINGS.

The Secretary said that they had ordered the same quantity of bird and fly nettings as last year, but since then they had received new applications for bird netting, which were 15 in excess of the supply. Seeing that they had a fair amount of money, about £170, in hand, he had written to the President pointing out how matters stood, and asking him to cable on behalf of the Board for additional 15 bird nettings.

The members expressed their approval of the Secretary's action.

IMPORTS.

The reports as to imports between May 29 and August 23 were as follows: Potatoes, 52,092 cases, plus 5 tons; food 3,550 cases; plants, 313; onions, 927 cases; tomatoes, one case.

COLD STORAGE.

The deputation to the Harbour Board Commissioners regarding the cold storage at the Docks reported that they pointed out to the Commissioners that the placing of a cold storage chamber at the

Amsterdam Battery as proposed would lead to disastrous results, experience having taught them that there was very great danger indeed in transferring from such a cool chamber to that of the ship, and that it was absolutely necessary if the fruit export trade were to be a success to have a cold storage chamber as near as possible to the ship's side. These arguments evidently had great weight with the Commissioners, who agreed to accede to the deputation's wishes in this respect. The whole subject as to dimensions, spot where the cool chamber was to be erected, etc., were fully gone into by the deputation, and finally closed up, to the entire satisfaction of the deputation. The building of the cold storage chamber, which the Commissioners promised to proceed with without delay, was now all that had to be done to attain the object which the Board had so long striven for, viz, to put on a satisfactory and permanent basis, so far as the cold storage was concerned, the fruit export trade.

Mr. Cloete said after the foregoing report was prepared and submitted, they saw that the Commissioners reopened the question as to the position to be occupied by the proposed cold storage chamber. He understood that another site had been fixed on, but that it was quite as good as the one originally inspected.

Mr. Malleson stated that the original idea was to put the cold store on a site between the two jetties, but it was now to be placed on the outside of the Loch Jetty. Mr. Malleson added that he thought that the Board should take some action with reference to the shortage of trucks.

The Chairman: I think that matter might be discussed later on.

RAILWAY FACILITIES.

The Secretary said he had received a letter with regard to the resolution passed by the Board on March 7, 1900. The letter was in reference to the complaints by Mr. Malleson, and it was agreed at that meeting that the letter should stand over, and be considered before the coming fruit season. He thought it was time that the Board should take some action in regard to the matter.

The Chairman said that it was scandalous the amount of fruit that was stolen from the railway trucks used for transport. He was also of the opinion that the matter should be considered by the meeting.

Mr. Malleson said that during the last fruit season he made a great many complaints to the railway authorities in regard to the thefts of fruit from the railway. He sent large amounts of fruit from Hex River, and a number of the cases were either stolen, or partly smashed, and the fruit taken out. He thought that on account of the nearness of the fruit season it was time that the question was fully gone into. Members of the Board and others generally supposed that the thefts had been committed by the military, but it was very largely due to the officials of the railway. (Hear, hear.) The management of the railway, he was of opinion, should be appealed to in regard to the matter.

The Chairman said that there was at present a new Railway Manager, and he believed that he was inclined to do everything in his power to benefit the public. He thought that a deputation should see the Commissioner on the subject.

Mr. Van der Byl agreed with the Chairman that a deputation should interview the Commissioner.

Mr. Malleeson said that the Board should bring the matter strongly to the notice of the Commissioner. The Railway had made it their business to send fruit in open trucks, with the remark that anything was good enough for fruit. Why should not the Government have cold storage trucks for the transportation of fruit, the same as meat was conveyed up-country? He was of opinion that the same facilities should be placed at their disposal as the cold storage companies received.

Mr. Cloete thought that the Board should communicate through the Government to the General Manager of Railways, as it would take them some time before satisfaction would be obtained if they saw the manager. A deputation should be appointed, which would work out the details of the question and submit them to the Government. If they wrote a strong letter to the Government, it would serve as a record, in addition to a deputation from the Board interviewing the General Manager of Railways. That would be the easiest and quickest manner they could obtain satisfaction.

The Chairman said it would be acceptable. He thought the Secretary should communicate with the Commissioner, and ask him to appoint a suitable day for a deputation to interview, and also that the General Manager be present at the interview.

It was proposed that Messrs. Cillie, Van der Byl, C. W. H. Kohler and Malleeson form the deputation.

Mr. Malleeson proposed, and it was agreed to, that the Fruit Exporters' Association should be represented on the deputation.

Mr. Rabie drew attention to the scarcity of railway trucks for the conveyance of fruit.

The Chairman said that he was also of the opinion that such was necessary, especially at the present time, and drew attention to the manner in which the exporters suffered. What was really wanted was a double line of railway to Worcester. If they did not take some action in the matter, they would find themselves left out in the cold in the conveyance of their fruit to Johannesburg and other towns.

Mr. H. Meyers said he thought the question of double lines was in contemplation.

The Chairman was of opinion that the matter should be dealt with at the same time.

Mr. Meyers said the deputation should obtain facts, and make one deputation on the matter. He had just been sending fruit from Klapmuts, and when he made a complaint some time ago he was

asked why he had put the fruit in such nice little cases, for people to put under their arm. (Laughter.)

Mr. Malleson said he could show how many claims he had had refunded by the Government, on an average of three or four a week. He had a list of his claims for the last three years.

The Chairman asked whether the question of a double line of railway to Worcester was to go before the Commissioner.

Mr. Krige said it was a very great necessity, not only a double line to Worcester, but to De Aar. It had taken him a few days previously, eight hours to travel by train from Ceres to Stellenbosch, as they had to wait for other trains at various places on the line. The journey could be done in four hours.

Mr. Malleson: My train was three hours late this morning. (Laughter.)

Mr. Krige said it would be a great boon if the double line were laid down.

The Rev. Mr. Du Toit thought that the deputation should interview the General Manager. There was a Committee sitting in Parliament for the purpose of going into these matters, and he was of opinion that the Board should wait and see what was being done on the other side, before going into the question themselves. They should first find out what was being done by the Parliamentary Committee. He proposed that it should be left for the deputation to decide.

Mr. Malleson said that the two should be separated, and the question of the thefts gone into, leaving the Railway Manager to see what the Parliamentary Committee were doing.

It was resolved that the deputation consist of Messrs. Van der Byl, Cloete, Cillie, Malleson, and the Chairman, the deputation to bring the matters before the Commissioner.

LABOUR DIFFICULTIES: COOLIES OR ITALIANS.

An interesting discussion followed upon the difficulties that fruit growers experience in procuring labour for their farms, and a suggestion that the Government should be petitioned to import Indian coolies or Italian peasants. The matter arose out of three letters received by the Secretary. Mr. Van der Byl had written saying he thought it was time they got the Government to help in the matter of labour, and he suggested that on the agenda of the present meeting a direction should be placed to consider the importation of Italian labour, so that they could see whether anything could be done. Mr. Malleson had urged that the Government should be approached to allow the introduction of coolie labour under certain conditions, as under present circumstances the supply of labour was not equal to the ever increasing demand. Mr. R. D. Koch, of Simondium, *via* Paarl, wrote stating that at a meeting of the wine and fruit growers of Groot Drakenstein, held for the purpose of discussing the difficulties incidental to the short supply of labour, it

was resolved to request the Board to explain to the Government the difficulties under which they were working their farms. On account of the short supply of labour they were hardly able to maintain their farms in their original state of culture, and much less develop them as they could wish.

The Chairman said that these letters showed that the question of the scarcity of labour affected not one portion of the Colony only, but that it was being felt all over. The shortage was really worse now than ever it was. They had always felt that their labour supply was scarce, and now it was become so scarce that at some farms they found that they could not carry on their ordinary work, and that as to putting new ground under cultivation, it was quite impossible. He might say that in a good many districts there had been for years past an eagerness to get hold of grafted vines for planting out, and the prices of grafted vines had been going up by leaps and bounds. What had happened last season? Hundreds of people had their grafted vines standing in their nurseries, and they could not dispose of them because people could not get labour to plant them out. A little while ago they came to the conclusion that there were large portions of the country which might still be used for vine planting, but unless something was done to solve this labour problem these tracts of lovely soil would have to lie waste and useless for years to come. The wealth that was being lost to the country through this dearth of labour was tremendous, and individually they could not grapple with the problem. The only people who could come to their assistance were the Government, who should take up some definite scheme, whether it were the introduction of Italians, coolies, Japanese, or any other labour, it was not for them as a Board to decide; that was purely a question for the Government to determine. He had been furnished with some particulars as to Indians, who, he was told, could be imported into the country at a very cheap rate and who were prepared to work at a low rate of wages, say 15s. a month plus food, or 22s. 6d. to provide their own food. He did not believe for one moment that any Indian labourer was equal to the Cape labourer, who, he supposed, as far as farms were concerned, was about the finest labourer in the world. (A Voice: If you can keep him sober.) Well, as to that, he thought the Cape labourer could be kept sober, and he must admit that he had seen more drunkenness among the workmen of Scotland than he had seen among the Cape labourers. The Chairman went on to refer to the experience of Natal in regard to Indian coolies, and attributed a great deal of the prosperity of the sister Colony to the introduction of the coolie element.

Mr. Van der Byl observed that the situation had become really grave in the Stellenbosch district, and they were unable to carry on their ordinary farming operations properly on account of the scarcity of labour. He asked whether it would not be advisable to approach the Government with a view to the importation of Italian labourers on experimental lines.

Mr. Malleson also testified to the acuteness of the problem as shown by his own experiences. With regard to Italian labour, he thought that the importation of Italians would be fraught with danger because of the question of colour, as his own idea was that it would lead to trouble if they put the white man and the black man on an equality at work. If they imported a lot of Italians and employed them as labourers it seemed to him that the black men would get a very exalted idea of their own importance. There were also moral difficulties of no little moment. He thought one way of relieving the scarcity would be to try and induce the Government to employ a smaller number of Cape boys on the railway. He was told that coloured platelayers were being paid 3s. 3d. a day, and really they did nothing but idle their time away, except when a train was passing. It was really the railway that was taking away a large number of the boys that ought to be employed on the farms. They required three or four times the present number of labourers in order to be placed in a satisfactory position.

Mr. Krige said that they were all agreed that more labour was needed, but the question was whether they should have coolies or Italian labour, and would it not, he asked, be advisable to have a batch of each class of labour imported for experimental purposes. He had had Kaffirs in his employ who had stayed in his service for two or three years.

Mr. Malleson: I would get them if I could, but I can't get them.

Another member remarked that he was not so much in favour of the importation of Italians as he was of coolies, but he would have the coolies placed under greater restrictions than in Natal, because it had been found in Natal they became competitors with the white farmer, and undersold him in the market. What they wanted in the Cape were men who would remain employees rather than become employers.

The Secretary remarked that one strong argument in favour of the importation of white labour, if there was no objection as regarded employees becoming employers, was this, that it was infinitely better for the country at large that we should have a white population of small farmers than a black population of small farmers. After all, the men who occupied the land were the men who made the country. If they had a peasant population of coloured labourers they would make this country a black country. He thought a peasant population, such as could be found in England, France and Germany, under a system of small holdings, was the sort of population that we wanted in this Colony.

Mr. Du Toit said that the subject had already got beyond the experimental stage. The coolies had shown themselves well fitted for this work, and it had been proved time after time that they could not get the Kaffir to go on the farms, as he was required to do. He thought they should go to the Government with a direct recommendation to import coolie labour.

Mr. H. Meyers remarked that the state of things was bad now, but it was likely to be very much worse in the near future, with the important public works which they had in prospect, and which would absorb a great deal of Kaffir labour.

Mr. Cloete said that unless this labour problem was tackled in a whole-hearted manner, not only would they fail to extend their farms, but they would actually go back in the matter of cultivation. He knew from practical experience at Constantia how costly and how unsatisfactory was the labour to be obtained. As to the importation of Italians, he knew that those who came from the North of Italy were really first-class men. He was in favour not of an occasional shipful of men now and again coming into the Colony, but of having a constant stream of immigrants. He thought they should have the coolie imported under five-year contracts, and then at the end of the contract allow him to return if he wished. They should have a constant stream of Italian immigrants as well as of coolies. The Italian would be a good colonist; he would buy land, and it would be to the advantage of the Colony that he should settle here. He thought the Government might be approached with regard to the importation of both Italians and coolies.

Mr. Malleon replied that the question was not acute so far as the better class of labour was concerned; he could get as much white labour as he required, in the way of overseers and so forth. What they needed was somebody to do the hard unskilled work on the farms.

Mr. Du Toit moved that they should appoint a deputation to approach the Government, with a view to the importation of coolie labour.

Mr. Cloete moved as an amendment that the motion of Mr. Du Toit be enlarged, so as to include agricultural labourers from Germany and Italy, as well as coolie labour.

Mr. Rabie supported this suggestion.

The motion was amended to embrace Mr. Cloete's suggestion, and was carried without dissent.

Mr. Van der Byl thought they ought to have no delay in this matter, because the question was of great urgency.

The following were constituted the deputation to wait upon the Government:—The members of the deputation to the Railway Department, and Messrs. Rabie, Cloete and Du Toit.

FERTILISERS.

Mr. Van der Byl brought before the Board the need of approaching the Government to set aside a certain sum of money for experiments with fertilisers, to be carried out in each district.

Mr. Du Toit endorsed the suggestion of Mr. Van der Byl.

A letter was read from Mr. H. Schultz, of Durban, as agent for a firm of dealers in artificial manures, offering a supply of manures free for the purpose of experiments as an object-lesson to the farmers of the Colony in manuring.

It was resolved that the offer should be accepted with thanks, and that the Secretary should distribute the manures when received, and take steps to have the experiments carefully tabulated and reported upon. He was also requested to communicate with the Government with regard to a grant.

WINE SHOW.

The Secretary raised the question of taking steps to re-institute an annual wine show. He pointed out that when the shows were formerly held, the Government granted about £300 in prizes, but ultimately Parliament stepped in and said that they would not award prizes, but they would give a certain sum of money, provided the promoters of the show raised a certain amount themselves. Since that time no show had been held. The Government had now undertaken to provide five-eighths of the prize money, and the amount that the Board ought to raise was about £112 or £115. He considered that the Board should set apart a certain amount of their funds, that they should approach the wine merchants of Cape Town for subscriptions, and that subscriptions should also be invited from agricultural societies, fruit growers, farmers, and others interested in the matter.

It was decided that the show should be resuscitated, and a committee was appointed to make all preliminary arrangements towards the carrying out of this idea. The committee is to be composed of the Hon. John Frost, Mr. Cloete, Mr. Rabie, Mr. Krige, and the Secretary.

ORANGE STOCKS.

Mr. Cillie, Cson, and Mr. Meyers raised protests against articles which had appeared on orange stocks in the *Agricultural Journal*, and contended that they had been most misleading and mischievous.

Mr. Lounsbury said he did not think it was requisite that they should protest, and he pointed out that arrangements had been made for a thorough testing of several varieties suitable for growth in South Africa, the Florida sour stock and the European bitter Seville, and so forth.

THE LATE MR. DE WAAL.

A letter was read from Mr. Pickstone regarding the steps the Board were taking in regard to the proposed memorial to the late Mr. De Waal.

Mr. Cloete said that the deceased gentleman had been for many years Secretary to the Board, and at Constantia a committee was formed for the purpose of considering the advisability of erecting a memorial to perpetuate his memory. The committee was formed with power to add to their number, so that intimate friends of Mr. De Waal might become associated with the work. He thought that the Board should form part of the committee. The other committee would do the practical part of the work, and he considered that in electing the Board to the committee they would obtain contributions from other outlying districts.

The Chairman did not think the members could join the committee as a Board, but he was of the opinion that they would be willing to do so individually.

Mr. Cloete said that speaking as President of the Constantia Fruit Growers' Association, he thought they would be very pleased if the Board would do so.

Mr. Van der Byl moved that a reply be sent to Mr. Pickstone stating that, individually, the Board would be prepared to act in conjunction with the committee.

This was agreed to.

DISPOSAL OF FARM PRODUCE.

A letter was read from the Agricultural Department with regard to the disposal of farm produce. The letter stated that at Constantia it was 106,916 lbs., comprising all the different varieties of fruit, 2,952 lbs. of which were shipped to Covent Garden, London, and the rest sold to callers at Constantia.

A letter was read from the Under Colonial Secretary with regard to the same question, in the course of which it was stated that at the Porter Reformatory the amount for fruit sold was £9 3s. 10d. ; mixed vegetables, £499 7s. 11d. At Elsenburg, 29,919 lb. of vegetables were sold for £87 7s. 2d.

It was resolved, on the motion of Mr. Cloete, that the matter be discussed at a future date.

ON PUBLIC SERVICE.

A letter was read with regard to an application made by the Board that their letters might be allowed to be forwarded to their destinations on public service. A reply was received from the Under Colonial Secretary, stating that the application had been submitted to the Postmaster-General, and it was decided that the application could not be granted, as other institutions on the same standing as the Board had not the same privilege.

THE ELECTIONS.

The Secretary read resolutions of the Board with reference to the election of new members, in which it had been agreed that, as Martial Law was in force, the elections could not be proceeded with.

The Chairman said no election had been held for some time, and the Secretary was of opinion that the elections should be held at the present time.

Mr. Cloete said that some of the districts had held their elections.

The Chairman said it was for the Board to come to some resolution.

Mr. Van der Byl said the Board had better wait until Martial Law had been completely withdrawn, and he proposed that the matter be left over until the following meeting, when the Board

would be in a better position than they were at the present moment.

It was decided that the matter stand over until the next meeting.

REGISTRATION OF TREES.

With reference to the registration of fruit trees, a report was read from Mr. C. Mayer, in the course of which it was stated that he thought that competent gentlemen should be appointed and a remuneration fixed, as it was a very laborious undertaking. It was agreed that the matter should stand over.

A PROPOSAL NEGATIVED.

A letter was read from the Under Secretary for Agriculture, in reply to the suggestion of the Board that an agricultural museum should be established for the convenience of newly-arrived farmers and other interested persons. The letter stated that the Department had not a room available, and also of the expense that would be incurred should such a project as that contemplated by the Board be acted upon. In conclusion, the letter stated that such a suggestion could not be taken in consideration.

On the motion of Mr. H. Meyers, it was resolved that a letter be addressed to the Under Secretary for Agriculture, regretting that the proposition of the Board could not be taken into consideration, as it would have been for the benefit of the country if the museum were established.

Mr. Lounsbury exhibited a model case of a new pattern to the members of the Board, and explained the advantages of the case, after which the Board adjourned.—*Cape Times*.

MANGE OR BRANDZIEKTE IN HORSES.

A Prevalent Complaint.

How Best to Treat It.

Mange or Brandziekte in horses a damaging parasitic skin disease, is more or less prevalent all over South Africa at the present moment. It is reported on all sides and in view of the general outbreak, we republish the following from that excellent work "The Diseases of the Horse and their Treatment," by Mr. D. HUTCHESON, C.V.S.

ANIMAL PARASITIC SKIN DISEASES.

MANGE, SCAB, BRANDZIEKTE, OR ACARIASIS.

This is a disease of the skin which is due to the irritation produced by certain little mites, called acari. There are three species of these acari which infest the horse, (a), the *Sarcoptes equi*, which burrow under the epidermis, and affect the horse principally about the head, neck, and fore-quarters, but may spread all over the body. The form of scab produced by this species of acarus is characterised by a more or less wrinkled condition of the skin, in addition to the ordinary scurfy appearance, and constant itching.

It is of some importance to know that this species of scab insect is readily conveyed from calves and common goats to horses, and even to man, and *vice versa*. (b). The second species of scab insect is called the *Dermatodectes equi*, or *Psoroptes equi*. This acarus pricks the skin, but does not burrow, it lives amongst the scabs, and about the roots of the hair, and being much larger than the other species it is easily discovered. It causes more itching than the sarcoptic species, but the scab produced is drier, has not such a deep crust, and there is not such a wrinkled condition of the skin, as in that other variety. (c). The third species of scab acarus which infects the horse is called the *Symbiotis equi* or *Dermatophagus equi*.

This acarus affects the heels and legs of horses, more particularly; it bites the skin but does not burrow, it congregates in large numbers in the epidermis however, but does not wander about so much as the second species does. It is this species which produces the common scab of the angora goat.

Symptoms.—The common symptoms of mange are incessant itching and scratching; the skin becomes scurfy and partially denuded of hair, and may present in addition eruptions of small pimples, or abrasions of the skin from the constant scratching. In the sarcoptic variety, as already stated, there is generally a wrinkled condition of the skin especially about the neck, and a moist, serous exudation in the grooves of the wrinkles. In the symbiotic variety, which affects the legs, the horse is repeatedly stamping with his feet, and rubbing one leg with the opposite foot until the legs become quite raw. If you scratch a mangy horse on the affected parts he will lean towards you, and move his lips and teeth very much as if he was doing the scratching himself.

Treatment.—This consists in destroying the acari, and restoring the skin to its original healthy condition. This is easily enough accomplished, providing that the dressing is thoroughly done. Partial dressing is rarely effective; a mangy animal should be dressed all over, if you wish to avoid disappointment. Care must be exercised, however, in dressing the horse all over with any of the carbolic dips, not to use them too strong, as it is a curious fact that a five per cent. solution of carbolic acid, which may be used with perfect safety on a horse, over the half of his body, may produce

fatal results when applied over the whole body. A dressing of carbolic acid and oil, which is a most efficient remedy for mange in the horse should not be used stronger than one of carbolic acid to thirty of oil, when it is applied freely over the whole body. Before coming to this Colony I cleared a stud of seventy omnibus horses by three dressings without losing a day's work with one of them. The plan adopted was as follows: each horse as he came in from his work was thoroughly dressed from nose to tail, and from back to hoofs with horse oil (melted horse's fat), which is a splendid lubricant. There was nothing added, only he was saturated with it. The following day, before each horse went out, this oil was washed off thoroughly by a mixture consisting of soft soap one pound, bi-carbonate of potash one ounce, and crude carbolic acid one ounce. This mixture was made into a creamy emulsion with hot water, and rubbed well on to the skin of the horse all over, thoroughly incorporating it with the oily dressing, and then washing the whole off with an abundant supply of clean warm water. The horse was then scraped, rubbed down, and sent out to his work, his harness being cleaned at the same time. Three dressings were repeated in this manner, at intervals of three days, after which the stables were lime-washed and disinfected, and all utensils treated similarly, and no further trouble was experienced with the disease, although it had been in that stud for over two years previously.

In treating scab or mange, whether it be in horses, cattle, sheep, goats, or dogs, the primary consideration is thoroughness and the repetition of the dressing within a week or ten days, as none of the dressings, that I am acquainted with, kill the eggs. An oily dressing acts best on the horse, because it sticks on better than a watery solution, and it lubricates the skin, which is much wanted. Crude castor oil, or whale oil, mixed with sulphur, carbolic acid, Jeye's fluid, or similar well-known parasitocides, acts very well. Paraffin and oil, one of paraffin to two of oil, acts very well also. Tobacco decoction, one pound in five gallons of water, and freely applied, or the principal sheep dips, used as directed. The horse should, however, get a thorough good washing with soft soap and a little bicarbonate of potash between each dressing, and all harness, ~~cloths~~, brushes &c., thoroughly cleaned.

Horses often suffer from great irritation of the skin, when they are kept close to fowl-houses or poultry yards, from the *Chicken acari*—*Dermanyssus Gallinæ*—passing on to them.

Treatment.—Remove the cause, limewash the stable, and, thoroughly clean the floor and surrounding yard with some strong mixture such as carbolic acid and hot water, one in twenty. If there is much irritation of the skin of the horse, wash him with warm water and soap, and apply a little weak, white lotion all over, or a weak solution of carbonate of soda.

THE DARBY LAND DIGGER.

An esteemed correspondent in the Eastern Province forwards the following extract from the *Farmer and Stock Breeder* describing a digger or cultivator which ought, he says, if all that is stated be correct, to suit such wheat-growing districts as Wodehouse and the Conquered Territory in the Orange River Colony :—

Though the Darby Land Digger has been before the public for some time, the improvements made during recent years have brought it more prominently than ever to the attention of the public. This machine is almost too well known to require description, but a few words on its salient features may be interesting to some. The digger is triangular in shape, the base of which is attached to an ordinary traction engine, and the apex is supported by a wheel of its own. The feature of the work is that it approaches more nearly to hand digging than any mechanical implement; in fact, the work is practically the same as that done by the spade. Along the sides the diggers are arranged in pairs, revolving round a common axis and each revolving round an axis of its own. The digging discs have a screw-like action, which raises the ground and stirs it thoroughly. This screw-like action also helps to push the engine forward, and explains the success of the implement on moderately soft soils. The digger is not rigidly fixed to the engine, so that its motion is not dependent on it, and it moves up and down independently of the engine. The diggers have a tendency to dig deep, so that this always keeps the digger in the ground.

One or two of the advantages of the digger may be briefly noted. One which will occur to anyone who has seen the digger stationary or at work is that with the digging action, and from the fact that the engine goes first, there will be no pan, and that the soil will be perfectly disintegrated behind, so that it will be thoroughly aerated. Roots of crops having no pan to encounter go deep, and straw crops do much better. The subsoil is stirred, but not brought to the top, while weeds are drawn to the surface. The diggers are always in action, and are never wasting their substance above the ground; and by the time the last disc has finished with a particular part of the land it is thoroughly broken up. The work is evenly distributed through all the machine, so that wear and tear is equal. The effective breadth cultivated is 17ft. 6in., and an acre an hour is easily done. The engine only requires coals, and does not weary, so that in a time of hurry its value can well be estimated. In the summer time a fifteen hours day can easily be got, and a driver and his mate can easily keep this up for a week or longer at a pressing time. Ninety acres in a week on the biggest farm is a considerable lump out of the way in a busy time, work that would require a large staff of horses and men to accomplish in the ordinary way. Cost

will depend on the price of coals and labour, but allowing for replacement and interest on capital, 8s. per acre is a liberal estimate. The digger is seen at its best tearing up hard and dry soils that horses and plough would make but little impression on.

The works are at Wickford Junction, Essex, where the machines can be seen or particulars will be supplied by post on application to Mr. Darby.

CORRESPONDENCE.

SCAB AND ITS PREVENTION.

Anti-Simultaneous Dipping.

Heartwater and its Ravages.

A Vigorous Interrogator.

To The Editor AGRICULTURAL JOURNAL.

Sir,—You advocate “a thorough and systematic dipping of all sheep whether clean or infected.” Do you imagine there is any justification for such enforced dipping of clean sheep? You are aware, of course, that most flagrant breaches of the Scab Act, which endanger the cleanliness of half a district or more, are punished by a £5 fine or less. Yet you advocate fining the owner of clean sheep anything from £15 to £100, because wilfully ignorant, lethargic farmers in other parts will not cleanse their flocks. I do not and never will forget erecting dip and kraals and dipping my clean sheep some years ago at a cost of over £25 and a further loss on the wool, the Act having been amended to enforce simultaneous dipping—a sop thrown to rotten scab raisers to induce them to dip. If owners of scabby flocks in districts where retrogressives predominate cannot be induced to dip except by forcing us to dip our clean sheep, then it is time we had the statement in plain English. The Scab Inspector's books will prove that against very many of us there is no record for scab, but always a clean bill, and this in spite of repeated introductions of the disease from inland districts, for which a Legislature with pluck enough to fine up to £100 is needed. You may take my word for it, the only remedy for incorrigibles is to fine them out of the industry. If you want to clean the country allow a Committee

who have a clean record to draft a Bill. Those who keep their sheep clean in spite of the many risks of infection are the men who know how to eradicate scab. And before I close this subject allow me to say that it is doubtful whether any class of civil servants (I speak for those I have known in Eastern districts) do as hard work, as conscientious work, as the working Inspectors, with few exceptions. The system is good, the Act abominably weak. To cleanse sheep it is necessary to ensure the owners' best efforts. The onus of doing this should not be thrown on the Inspector, whose pay often barely suffices to keep him in sufficient horseflesh to do the work. This can only be done by heavily fining incorrigibles, and *strict 6 months quarantine*. Allowing really sick and doubtful sheep to move nullifies the Inspectors' best efforts. Trekking is more habit than necessity, a bad habit at that, for the best farmer is he who endeavours to make his ground suffice by developing the feeding and water capabilities of his farm.

Do you think there is any chance of inducing Government to import netting and let farmers have it at cost price? Of course we know they are all very busy. Much, very much, attention being required to guide the Ship of State safely to Conciliation Harbour. And, as we only lose 50 per cent. of our lambs more or less, plus a few thousand grown sheep killed by jackals, it may be an impertinence to ask for netting at cost; duty and carriage free. And here, to my brother farmers who have not tried it, may I say, that although netting has hardly passed the experimental stage as a general thing, yet, spending £260 or thereabouts saved 360 lambs for me in one season, over and above the average reared previous seasons without netting; other conditions being fairly equal. But it *must be done thoroughly*. It costs much, is hard labour, and takes a year or two, but is worth it, and if well done will return a percentage on outlay which is most welcome to the man who loses heavily by these vermin. A profit not easily set down on paper, for it includes saved lambs, saved time, better wool, and less worry.

Re the article on "Heartwater in calves." It is well known that cattle are subject to heartwater, though much more immune than sheep. Supposing equal numbers on same pasture, deaths in cattle might be 3 to 5 per cent. only of the number of deaths in sheep. I know no reason for supposing calves more susceptible than grown cattle. The latter, like grown sheep, after living on the same pasture six or seven years may and do take the disease and die. For this disease I do not believe an immunity can be conferred which is worth practising. Well bred cattle are more susceptible than hardy native cattle. It would be more interesting to hear of some effort being made to abate the plague of pathogenic ticks, or at any rate to make some investigation as to whether such means may not exist as will work their destruction under natural conditions. This I venture to believe can only be done by some fungus or disease capable of spreading amongst them. Nature does not fail of a remedy; it is we who fail to find it.

The balance of things is upset by the little brutes. Hundreds of thousands of acres otherwise capable of heavy stocking are yearly becoming less valuable. Is the Department making any effort to ascertain the immunity of Persian sheep or first cross Merino-Persian with a view of re-stocking some of this ground?

Why condense such an excellent article as "Unknown Infectious Matter?" It is but seldom we get such information, nor do we see a Veterinary Surgeon oftener than once in about five years or so. They are becoming rare, or favour the larger towns.

Re Rhodesia cattle disease, which, let us hope, is no new cattle plague. Will the Veterinarian who advised grass burning to destroy ticks please try it himself and note the results. In coast districts this end, it simply increases them. Those interested or doubtful might try the effect of burning grass in the parts mentioned in January to February, noting the amount of ticks before and after new grass has grown. I remember when redwater first came down cattle dying worse on such "brant" than on old grass.—Yours, etc.,

A.W.

Toise, Sept. 4th, 1902.

[This letter is dealt with in the Editorial Notes.—ED. *Agricultural Journal*.]

SWISS MILK GOATS IN SOUTH AFRICA.

The Toggenburg Variety.

A Marked Success.

To the Editor AGRICULTURAL JOURNAL.

Sir,—I was highly pleased with your short notes on the Toggenburg goats and the illustration, which might have been taken for the portrait of one of those I imported. As the first importer of these goats to the Colony I have been simply overrun with enquiries from all parts of South Africa. I have been greatly surprised at the amount of interest taken in these animals, and I must confess to having been unable to reply by letter adequately to all the inquiries that reached me. I think therefore that a few notes from my own practical experience of these goats in South Africa would interest a large number of your readers. To start with, I imported 6 ewes in kid, which arrived here in the early part of March. Two died shortly after arrival, the others kidded in the second half of March and first half of April, each 2 kids. These 8 kids are still alive and in the

very pink of condition, and give every promise that the South African born stock will not be inferior in stamina to the imported.

One of the first questions nearly always asked by my correspondents was, how much milk do these Swiss goats give? It is difficult to give a direct reply to this query as so much depends upon the individuality of the animals, keep, &c., but I may say that 3 ewes of the 4 gave 4 to 5 bottles of milk each a day and this for about 4 months after kidding; they are still in milk and should remain so till December. The milk is free from any objectionable taste and smell, and thoroughly relished by my children.

Another question which has also been asked frequently is, how are they kept and what are they fed on? To the former question I may say that my goats are not pampered; they occupy in the night a dry but open shed and in the daytime they are in an open enclosure. Both shed and feeding pails, &c., have to be kept scrupulously clean as I find these goats particularly dainty in this respect. As to food, they will be found very accommodating: Grass, hay, lucerne (both green and dry) cut forage, bran, green or dry mealie stalks, pig potatoes, spekboom, and a variety of weeds also the leaves of all manner of trees. Rock salt is an absolute necessity for them.

Another point which has frequently been touched upon was, how would the cross between a Toggenburg (Swiss) ram and a common ewe turn out. I must say that I have no practical experience yet of this cross but I know that the same kind of rams have largely been crossed with English goats and with the best of results. In fact the British Goat Society's Champion Medal and Challenge Cup has been won by a goat who had obtained her Toggenburg blood from the father's side only, and it has thus been exclusively shown that the excellent milking qualities of these goats can also be transmitted by the male only. I myself am of opinion that Toggenburg rams mated with a good type of Colonial ewes should give an excellent cross for milking purposes. The offspring would have the advantage of being used to the veld and would not require any special feeding.

I am, Sir, Yours faithfully

W. KONSCHER.

Uitenhage, Aug. 28, 1902.

THE DEATH'S HEAD MOTH.

To the Editor AGRICULTURAL JOURNAL.

Dear Sir,—The *Acherontia atropos* I have always known to be called the Death's Head Moth but I can quite understand the name "Bee Moth" being attributed to it, owing to its fondness for honey. It instinctively finds out the whereabouts of hives which it enters;

but its intrusion does not seem to be objected to by the bees—at any rate there is no aggressive antagonism—though it will invariably be found that the bees endeavour to separate themselves from it by trying to construct some barrier between themselves and it. The superstition regarding it “at home” amongst old-fashioned country folk, that a death will occur in the family within the year, may perhaps be accounted for in this way. It is migratory—has no fixed habitat, but seems to make its appearance quite unexpectedly; it utters a peculiar sound. It is singularly marked—the death’s head on its thorax; and therefore altogether a weird specimen. I only know of one instance in which any injury appears to have resulted from a prick by it. A lady was attending to her hive when one suddenly alighted on her wrist. She felt a slight pricking sensation but nothing more of it. Very shortly afterwards, however, her wrist was reddened. She applied some *Liq. Ammoniae* to the part affected, but the inflammation spread both upward and backward for some considerable distance, and it was some days before the forearm resumed its usual appearance. It may not be generally known perhaps that it often feeds on potato leaves, and its larvæ (easily distinguishable on account of its markings) may be found in the ground.

I remain, Yours faithfully,

T. W. REES. B. A., L. L. M.

WHITE ANTS.

To the Editor AGRICULTURAL JOURNAL.

Sir,—In accordance with your request in *Queries and Replies* re pest of ants, I give you my experience with white ants.

I was troubled with them in my house and put some arsenic in the holes wherever I could find them in the house, without any good result whatever. I then looked up all holes about the house, put some arsenic in them and got rid of the pest at once. Close to a homestead these ants will not work during the day as the poultry feed on them; consequently the holes will have to be opened to put in arsenic. In lands and gardens it can be done while they are working.

Another good plan is to boil some straw of “biesjes” (cut short) in arsenic and throw about the holes.—Yours, &c.,

W. J. J.

Murraysburg, August 30th, 1902.

[It is stated that Jeye’s Fluid drives ants away. If anyone has tried it, or will do so, it would be interesting to know the result.—*EDITOR Agricultural Journal.*]

OVERSEA EGGS FOR SETTING.

To the Editor AGRICULTURAL JOURNAL.

Sir,—In a recent issue of your journal I notice correspondence on this subject. I should like to record my experience. Several years ago I had sent me from England 3 dozen eggs for hatching. These were packed in felt-lined compartments and enclosed in a stout wooden box. They were 30 days old when I received them. Hatching results nil. The next parcel came direct from a well-known English breeder packed in grass nests, and sent by parcel post, 30 days old on receipt. Hatching results nil. I broke each egg after the hens had been sitting for 25 days and found in all but one that the yolk had become broken and mixed with the white. The exception had a partially formed chick in it. Both lots came by parcel post.

Yours, &c.,

R. S. GUEST.

The Aviary, Grahamstown, September 2nd, 1902.

THE PRUNING OF CITRUS TREES.

The Results of Practice.

To the Editor, AGRICULTURAL JOURNAL.

Sir,—Allow me to congratulate you upon the improved form and character of the *Journal*. I note your appeal to farmers for their experience, and sincerely trust they will accept the invitation, as I am satisfied it will prove the most valuable and practical portion. At the risk of treading upon "Official toes," an ounce of practice being worth a ton of theory, I take exception to your advice *re* pruning of citrus trees. You say, or your paragraph says, "they should never be touched with the knife other than to remove the deadwood and small watershoots from the centre."

My experience and practice is totally at variance with this. I treat all my citrus trees exactly as I treat any other tree. I form their character while young and when they are old they will not depart from it. I treat all alike as I would treat a baby according to its disposition and constitution. If it grows up as I want it, I leave it alone, if it gets lobsided, cross-legged cross-eyed, sick or measly I take the doctor to it, if its all head and no understanding I shouldn't think twice of clipping its hair. I like a clean ancle, strong limb, and good outward growth; arms akimbo, bow legs, hump backed or dwarf abominations I despise. The young citrus especially if left to itself becomes a mass of entanglement and a prey to disease.

You are evidently referring to old bearing trees whose character it is wise not to interfere with; but you are wrong if you think they are satisfied with the nourishment and sustenance of the ground they shelter with their branches; mine ar'nt anyway. I take no account of what is under the branches, for the feeding roots are not there, anymore than they are of any other tree, they are yards outside. The fact is, the art of pruning is made far too much of, there is too much theory and too little common sense used. Check a child of a wayward, selfish or greedy inclination the moment you detect it, if it has gone on some time you must use the rod if nothing else will answer. So it is with a tree, and especially a citrus, rub off the shoots the moment they appear if you don't want them, if they have gone too far, use a knife and keep at it while its growing and you won't have to destroy in the winter what it has taken all the summer to produce. There are exceptions to this practice but it might be stated as a universal rule which the exceptions prove.

It often occurs to me a tree feels and objects to the knife as much as a child would and I can hear it say, why did you allow me to get into this state and let me use my energy to make this growth only to cut it off when it is matured? *Verbum sat sapienti.*

Faithfully yours,

W. GOULDEN.

Egerton.

[Mr. Goulden's letter is discussed in the Editorial Notes.—EDITOR *Agricultural Journal*.]

LUCERNE ON DRY LAND.

To the Editor, AGRICULTURAL JOURNAL.

Sir,—I have a camp of about 8 morgen which I ploughed 6in. deep in September last. I ploughed it again 8 in. in December and again 9in. about the end of January, and at once harrowed it twice. On February 25th I sowed 150 lb of lucerne and as I had not quite enough seed I filled the camp up with barley. The lucerne has been green the whole of the winter, the frost apparently not having affected it the least.

From the 1st June to August 15th I have had 200 sheep running all day in this camp and since I have taken them out the lucerne has shot up again splendidly.

I might mention that I had about 100 toothless old ewes on the lucerne and I have sold them all. They averaged 37 lbs each. which speaks for itself. I might mention that the frosts are very severe in the Wodehouse district.

Yours truly,

Dordrecht, Aug 28th, 1902.

AGRICOLA.

QUERIES AND REPLIES.

Washes for Red Scale.

"Novice," writes:—"As it is not quite clear to me, from the recent article in the *Agricultural Journal* on Lime-Sulphur-Salt wash, that you recommend the above for citrous as well as deciduous trees, I shall be pleased if you will, through the medium of the *Journal*, inform me whether it is suitable for citrous trees also. Should the above wash not answer for citrous trees infested with Red Scale, I shall be pleased if you will give the ingredients of some other wash suitable for above."

Lime-sulphur-salt wash should not be used for citrous trees, nor for any kind of tree in foliage. It is a late winter wash for deciduous trees. For the destruction of scale insects on orange, lemon, and other citrous trees, there is no treatment so successful as fumigation with hydrocyanic acid gas. A pamphlet giving full particulars of this remedy will be sent to any South African applicant. The best wash for the scale insects of citrous trees is resin wash. As the directions for preparing this excellent wash have not been given in the *Journal* for several years, they are now republished for general information. The wash originated in California as a result of experiments undertaken to find a cheap substitute for soap as an insecticide.

The standard formula is :

Crushed Resin	24 lbs.
Caustic Soda (98 per cent)	5 lbs.
Fish Oil	2 bottles.
Water to make	100 gallons (Imp).

The proportionate amounts of the ingredients for lesser quantities of the wash are often requested and for convenience are here given for a few :

Resin	12 lbs.	6lbs.	2½ lbs.
Caustic Soda	2½ lbs.	1¼ lbs.	½ lb.
Fish Oil	1 bottle	½ bottle	¼ bottle
Water to make	50 gallons.	25 gallons.	10 gallons.

First crush the resin, which may be easily done by placing it in a meal sack and pounding it. Pour at least two-thirds of a gallon of water into the cooking vessel for every pound of resin to be used.

add the soda and the oil and bring these to a boil. Then stir in the resin slowly and keep the mixture well stirred while the resin dissolves. If the liquid tends to boil over add a little cold water, never much. The mixture is at first milky, but as the resin goes into solution it becomes clear and dark brown. Boiling should be continued ten or fifteen minutes after all the resin is dissolved, and then water should be added to bring the total quantity of liquid above twenty-one gallons if the 130 gallon formula is followed, or the proportionate amount if another quantity. The making of the wash is then complete, and dilution only is necessary to make it ready for application to the trees.

It is an advantage to have the cooking kettle marked at the height reached by the number of gallons to which the wash is to be diluted in the cooking pot. The best height to mark is that reached by one-fourth the total quantity of water, or twenty-five gallons for the 100 gallon formula. Then if the concentrated wash is diluted to this mark, one has only to take one measure of the wash to three measures of clear water in preparing the dilute wash. This procedure obviates all the trouble of measuring by the gallon each time.

When it is convenient the full amount of water may be added to the other ingredients in the cooking pot; but it is generally much more desirable to make a concentrated wash as described and to dilute this as it is dipped out for use. When properly made the concentrated wash should keep without settling in a covered vessel. If left in an open vessel, it is apt to settle through part of its water being lost by evaporation; but if the amount lost is replaced and the wash heated until the sediment disappears, the wash seems as good as when freshly prepared.

Resin wash answers best when applied hot, probably only because it is then thinner and covers better. It is a good plan to always heat the water with which it is diluted. The spray as it strikes the foliage should not be above 130° F., but unless the spray is very coarse or the nozzle held too close the wash becomes cooled to much below this temperature before it strikes even when it is scalding hot in the spray tank.

A wash made without fish oil but otherwise as described is almost but not quite so good an insecticide as standard resin wash. It seems to be as effectual against aphides and soft scale insects but to be less effectual, usually, against the Red Scale. The substitution of soft soap for fish oil is sometimes practised when the oil is not easily procured; when five pounds of the soap are used in place of two bottles of oil, the resulting wash seems as efficient as the standard article.

Resin wash was originated to substitute soap washes, as already stated, and in experiments conducted by this office we have had better results with resin wash than with all soap washes that were safe to apply to foliage. However, it is often inconvenient to prepare resin wash, particularly when only a few trees are to be treated, and in such cases soap washes are frequently recommended

instead of resin wash by this office. Two pounds of soap, preferably soft soap, in five gallons of water gives results that are generally satisfactory. Not all the scale is killed, and hence repetitions of the treatment are usually necessary at intervals of a few months whichever is used.

Paraffine emulsion is very noticeably inferior to both soap and resin as a scale destroyer. A mechanical mixture of paraffine and water is a good scale destroyer, but, unfortunately, may do much damage to the trees if too much is applied or if the weather conditions are not just suitable. A special form of pump is necessary to apply the mixed oil and water, and for Red Scale the mixture should contain from 15 to 20 per cent. of oil. In experiments I have found that some scale escapes even when a 30 per cent. mixture was thoroughly applied.

CHAS P. LOUNSBURY, Entomologist.

Bee Culture.

Mr. M. H. Neser, Lukaskop, Philipstown, writes:—As I have noticed that from time to time articles have appeared in the columns of the *Agricultural Journal* on Apiculture, I would like to ask you certain questions on this subject in the hope that you will be able to give me some information.

1. Do you think that bee keeping on an ordinary Karroo farm will turn out profitably?

2. And if so, how many colonies should be kept there (there being no other colonies within say four miles of the locality)?

3. Which direction should the entrance to the hives have—North South, East or West?

4. Seeing that bees, almost without exception, kill all intruders from other hives which enter their own hives, what distance should the hives be placed from each other in order that there may be no danger of large losses on this account?

5. Is there any particular sort of flower that could be profitably grown for the production of honey?

6. Would it be possible to import good Queen-bees from Europe or America; and if so, what would be about the price per Queen?

7. Does the disease known as "foul brood" exist also in the Cape Colony? or is there a danger of introducing it with bees or Queen-bees?

8. Can one obtain anywhere in the Colony good up-to-date bee hives, and what is about the price?

9. How many pounds of honey could a colony, as a rule, produce in the Karroo in normal years, if it is worked on up-to-date lines. ?

10. Can you advise me how to keep out of the hives the "bee-moth" (*acherontia atropos*) ?

11. How does the moth in question pass the winter months ?

REPLIES TO MR. M. H. NESER'S QUERIES.

1. This will depend upon circumstances. Some parts might not repay the trouble. Ascertain with what success bees exist in the locality.

2. Do not commence with too many colonies (say not more than six) for first season and note carefully results.

3. North East, not too much shade, although a little protection from afternoon's sun will be beneficial.

4. Ten feet is sufficient for manipulating purposes, although there can be no objection to a greater distance if space will allow. It is desirable to enclose apiary with a fence strong enough to resist the intrusion of animals. Hives might be painted different colours to assist bees in reaching their own hive.

5. Unless planting is done by the acre it is not of much advantage, bees roam over about a two mile radius. The following are all good honey plants but am doubtful as to their growth in the Karroo unless irrigated : Dutch clover, Boragh, Buckwheat, Figwort all producing good honey ; Rape, Mustard, &c., producing coarser honey.

6 & 7. Queens have been imported also colonies of foreign bees, but no great success appears to have attended the efforts. It is difficult to preserve the strain, and there is also the danger of introducing foul brood, which at present is not known to exist in South Africa.

8. Messrs. Koch & Dixie of Cape Town import hives, but a more suitable production for South African requirements has been supplied by Messrs. Attridge & Son, of Sea Point.

9. This will depend entirely upon local circumstances, season, and the capabilities of the owner ; the quantity of honey obtained may vary from 20 to 100 lbs. per colony.

10. The presence of the moth need not trouble the bee-keeper ; they will not obtain an entrance in properly constructed hives, which should always be on the "Bar Frame" principle with one entrance only.

H. L. A.

Mal Di Gomma at Upington.

A correspondent at Upington wrote some weeks ago as follows:—

The orange trees in my garden appear to be diseased the chief characteristic being that the bark where the tree touches the ground appears rotten, it also cracks on the stem, coming off in pieces, tree becomes yellow, large portions of it leafless and dying back in some cases. Some although in full bearing are very yellow. Trees are seedlings of about 12 years old. Can you recommend any remedy as they are sure to die in a few years if not treated properly. There are no bugs on them. All the trees are not affected. The disease seems to be general along these parts of the Orange River.

This letter was referred to Prof. MacOwan who replied as under:—

Correspondent describes very accurately the symptoms of what is known as *Mal di Gomma*, a diseased condition of the orange which destroyed wholesale the orange groves of Sicily, Italy, and Spain about the year 1870. I recommend that he be referred to the article "Oranges and Lemons" reprinted in the *Agricultural Miscellanæ* pp. 315-327, particularly pp. 316, 317, 320, 321, 323.

It is very questionable if any treatment will arrest the disease if it has been of long continuance in an orange orchard. This will be seen on consideration of the causes which are found to work together for its production.

First:—The orange roots naturally keep near the surface; therefore, they are placed in unhealthy conditions if planted too deep. Secondly:—they require open soil and free drainage; the common custom is to plant the young trees in 2 ft. sq. holes, not in trenched ground. Rarely does the planter see to it that he has a French drain sunk down the slope and 6 in. or a foot below the feeding stratum of the roots. Further, as if to intensify the unhealthy conditions, it is usual to make basins around the collars of the trees, connecting these by a furrow, and to run water in every now and then till the basins stand full. That is, the mass of earth in the undrained hole in which the tree stands is saturated with standing water, the vital air which the roots require is drowned out and the tree is temporarily asphyxiated. Besides, the soaking of the collar for hours, and subsequent exposure to the hot sun, are most injurious conditions leading to the cracking of the outer bark and exposure of the cortex within to mechanical and fungous injury. These cracks become the seat of disease and the ultimate dying out of portions of the tissue. The death of the living cells is preceded by an alteration of the sap which becomes fetid and gummy. Hence the name *Mal di Gomma* given to this morbid condition in South Europe.

As soon as the gummosis has spread around the whole circumference of the collar, the tree is certain to die, as surely as if it had been ringed with an axe.

It is clear that the *Mal di Gomma* is the result of unskilful treatment, and therefore that it is impossible to formulate a cure. There is no empirical "tip" such as the practical man who works by sheer rule-of-thumb so often asks for.

The avoidance of *Mal di Gomma* consists in the proper selection of suitable open soil, its thorough breaking up and aeration, and its perfect drainage. Next, the planting at the proper depth and the arrangement of the irrigation trenches at least 3 feet away from the collar of the (mature) tree. Next, the encouragement of the drooping lower branches to shade the trunk from the hot sun, instead of trimming them up high to get space for growing vegetables among the oranges. Lastly the selection of trees grafted on Bitter Seville stocks, (for all kinds which suit that hardy variety) instead of graftlings on the lemon.

If it is desired to attempt a sort of surgical treatment of *Mal di Gomma*, and as far as possible alter previous improper culture, the gummy and disintegrated portions of the collar may be cut out clear down to the wood with a wide shallow curved gouge, taking care to remove all the altered tissue. The cut surface is then dried as completely as possible and a coat of ship tar applied. On no account must water be applied any more to the collar, and the trunk should be protected from the sun's rays. As a help towards husbanding the resources of the tree, its branches should be cut back somewhat, taking care to leave no snags, but to cut clean along the out spring of each limb removed. Also a tree under treatment for recovery should not be allowed to spread itself in fruiting.

If the orange were systematically treated with something like the care bestowed upon the vine, it is not much we should hear about trees rotting at the collar with *Mal di Gomma*.

ARTIFICIAL MANURES.

The annexed list showing the agents from whom the various artificial manures may be obtained, and the current prices, is published for the information and guidance of agriculturists.

Full particulars as to the composition of the respective fertilizers can be obtained on application to the agents; and attention is also invited to the analyses published in the *Agricultural Journal* of 9th January, 2nd April and 11th June, 1896; 30th Sept., 1897; 27th Oct., 1898; 13th April, 6th July, 1899 and 18th July, 1901.

LIST OF FERTILIZERS.

Attwell & Co., Cape Town. (Agents for Alex. Cross & Sons, Ltd., Glasgow.)	Special Root Guano	..	£6	10	0	per ton of 2,000 lb,
	Potato and Grain Guano	..	8	5	0	" "
	Nitrate of Soda	..	12	0	0	" "
	Superphosphates 39/40 per cent.	..	6	0	0	" "
	Scotia Basic Slag (cont. 30 per cent. Tribasic Phosphate of Lime)	..	4	15	0	" "
	Sulphate of Ammonia	..	0	19	6	per 100 lb. "
(Prices free on trucks, Cape Town)						
Jas. Searight & Co., Cape Town.	No. 1 Superphosphates	..	£5	0	0	per ton of 2,000 lb.
	(containing 12·14 per cent. Phosphoric Acid soluble in water, being equal to 26·30 per cent. Tribasic Phosphate of Lime).	..				
Jas. Searight & Co., Cape Town.	No. 2 Superphosphates	..	5	10	0	" "
	(containing 14·16 per cent. Phosphoric Acid soluble in water, being equal to 30·35 per cent. Tribasic Phosphate of Lime).	..				
	No. 3 Superphosphates	..	£6	0	0	per ton of 2,000 lb,
	(containing 17·18 per cent. Phosphoric Acid soluble in water, being equal to 37·39 per cent. Tribasic Phosphate of Lime).	..				
	Vine Fertilizers	..	9	0	0	" "

A reduction of 5s. per 2,000 lbs. is allowed on orders of 100 bags or more. Special rates can be arranged if delivery is taken ex importing steamer, the goods being trucked at Docks.

Woodhead, Plant & Co. Cape Town.	Thomas' Phosphate Powder	..	£4	15	0	per ton of 2,000 lb.
	Superphosphates	..	5	15	0	
	Nitrate of Soda	..	14	0	0	
	Muriate of Potash	..	16	0	0	
	Sulphate of Potash	..	16	0	0	
	Wheat Fertilizer	..	8	10	0	
	Kainit	..	4	15	0	
	Potato	..	1	15	0	per 200 lb.
	Vineyard Manure	..	1	15	0	"
	Tobacco Manure	..	1	15	0	"
	Sulphate of Ammonia	..	1	2	6	per 100 lb
Subject to a discount for cash.						

De Waal & Co., Cape Town.	Jadoo Fibre	10s.	6d.	per bale of 100 lb,
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White, Ryan & Co., Cape Town.	Potato, Vegetable and General garden	£8 10s. per ton of 2,000 lb. If less than $\frac{1}{2}$ ton 18s. 4d. per bag of 200 lb.
	Pure Ground Bone	£6 10s. per ton of 2,000 lb. If less than $\frac{1}{2}$ ton 13s 6d. per bag of 200 lb.
White, Ryan & Co., Cape Town.	Quick-acting Bone and Potash Mixture	£7 per ton of 2,000 lb. If less than $\frac{1}{2}$ ton 16s. per bag of 200 lb.
	Selected Bone Meal for Cattle, Horses, Pigs and Poultry ..	15s. 6d. per 100 lb.; special price per ton.
	Bone Grit for Fowls	12s. 6d. per 100 lb.
	Superphosphates	Wholesale only.
Malcomess & Co., E. London.	"Malcomess" A. Fertilizer, for Potatoes, Mealies, Vegetables, Orange and other trees ..	£9 per ton of 2,000 lb.
	"Malcomess" B. Fertilizer, for cereals, especially wheat ..	£9 per ton of 2,000 lb.
	Accompanied by guaranteed analysis by Prof. Hahn ..	(less 5 per cent for cash).
	"H.B.T." Gypsum	£8 10s. per ton of 2,000 lb.
James Flower & Sons, Cape Town.	Pure Ground Bone Meal	£8 10s. (in bags f.o. trucks—Cape Town).
Government Guano:—Ordinary Guano		£6 10s. per ton of 2,000 lb. or 13s. per bag of 200 lb.
	Rock Guano	£6 17s. per ton of 2,000 lb. or 18s. 9d. per bag of 200 lb

For use within limits of Colony.

Price includes delivery at Cape Town Railway Station.

D. E. Hockly & Co., East London.	"Hockly's Special Fertilizer." A complete manure for all crops } Pure Bone Meal	£9 per ton of 2,000 lb. less 5 per cent for cash. Special Price.
J. G. Steytler & Co., Cape Town.	Phosphates or Basic Slag ..	£4 2 6 per ton of 10 bags each 200 lb.
	Superphosphates ..	4 12 6
	Dissolved Bone ..	6 7 6
	Grain Fertilizer ..	7 0 0
	Potato Fertilizer ..	8 0 0
	Vine Fertilizer ..	8 0 0
Henry Ries & Co. East London.	Agents for the Lawes Chemical Manure Co., Ltd., of 59, Mark Lane, London, who prepare fertilizers for them, which they sell at the undermentioned rates:—	
	Ries' Potato Fertilizer ..	15s. to 17s. 6d. per bag of 200 lb.
	„ Special Dissolved Bone ..	8s. 6d. to 10s. „ of 100 lb.
	„ Special Cerea Manure ..	8s. 6d. to 10s. „ of „
	„ Ordinary ..	7s. 6d. to 9s. „ of „

For the potato fertilizer they make a reduction of 1s. 6d. per bag on orders for 10 to 25 bags, 2s. on orders for 30 to 50 bags, and 2s. 6d. on orders for 50 to 100 bags. For the other three lines they make reductions of 6d., 1s. and 1s. 6d. per bag respectively on orders for 10 to 25, 30 to 50, and 50 to 100 bags. Analysis guaranteed as per list.

The Produce Market.

CAPE TOWN.

Messrs. Wm. Spilhaus and Co. report under date, Saturday Sept. 20, as follows:—

Ostrich Feathers.—There was only a small quantity offered on our local market this week. The offerings consisted chiefly of wings. Although we make no material change, prices were in sellers' favour for good quality. A parcel of ordinary goods had to be withdrawn. Business for the day, 340 lb., which sold for £778.

	£	s.	d.	£	s.	d.		£	s.	d.	£	s.	d.
Whites (primes)	10	0	0	15	0	0	Blacks (Long) ..	4	0	0	5	10	0
Firsts ..	7	10	0	10	0	0	Long Medium	2	10	0	3	10	0
Seconds ..	5	10	0	6	10	0	Medium ..	1	0	0	1	10	0
Thirds ..	3	10	0	4	10	0	Short ..	0	5	0	0	10	0
Inferior and stalky	1	10	0	2	0	0	Long Floss ..	1	5	0	1	10	0
Byocks ..	4	10	0	6	0	0	Medium Floss	0	7	6	0	10	0
Feminas (super)	6	0	0	8	0	0	Short Floss ..	0	2	6	0	5	0
Firsts ..	4	10	0	5	10	0	Drabs (Long) ..	2	0	0	3	0	0
Seconds ..	3	0	0	4	0	0	Long Medium	1	5	0	1	10	0
Thirds ..	2	0	0	2	10	0	Medium ..	0	10	0	1	0	0
Inferior ..	0	10	0	1	0	0	Short ..	0	2	0	0	4	0
Dark ..	3	10	0	5	0	0	Long Floss ..	1	5	0	1	10	0
Spadonas (White)	1	10	0	2	0	0	Medium ..	0	5	0	0	10	0
Light and Dark	0	10	0	1	0	0	Short ..	0	2	0	0	3	0
Boos (White) ..	1	0	0	1	5	0	Inferior Long						
Light ..	0	17	6	1	2	6	Blacks & Drabs	0	15	0	1	0	0
Black Butts ..	0	7	6	0	10	0	Floss ..	0	4	0	0	5	0
Dark ..	0	7	3	0	10	0	Wiry ..	0	0	6	0	0	6
Inferior ..	0	3	0	0	5	0	Chicks ..	0	0	6	0	1	0

Wool.—The London sales opened on Tuesday, the 16th inst., and we hear by cable that prices were firm, with an advance for combing wools. This news has already been discounted here, and our local market showed, therefore, no change in values. Yesterday some 250 bales were offered. Amongst these there were several lots of snow-whites. A parcel of rather burry and short wool well scoured brought 1s. 4d. per lb.; for a lot of ordinary snow-white, 1s. 3½d. was refused; extra supers sold at from 1s. 5½d. to 1s. 6d. per lb.; white coarse, 7½d.; coloured coarse, 6½d. grease, 3½d. Amongst the grease wools offered, there was nothing remarkable in quality, but all fetched full prices of last week. We quote: Karoo grease for combing, 6d. to 7d. per lb.; Karoo grease for scouring, 4½d. to 5½d. per lb.; snow-whites, ordinary, 1s. 1d. to 1s. 2d. per lb.; snow-whites, super, 1s. 3d. to 1s. 5d. per lb.; snow-whites, extra super, 1s. 5½d. to 1s. 6d. per lb.

Skins.—We quote. Merino long wools, 5½d. per lb.; merino short wools, 4½d. per lb.; pelts, 3½d. per lb.; bastards, 3½d. per lb.; goatskins (sound), 10d. per lb.; sundried, 6d.; scurry, 6d. each; Angoras, 4d. per lb.; pelts, 3d. per lb.; Capes, 1s. 9d. each; cut, 1s.; damaged, 6d. each; other descriptions according to quality.

PORT ELIZABETH.

Messrs. John Daverin & Co. report under date September 19. :—

Ostrich Feathers.—The market was freely supplied this week with a good average assortment, which met with a more general and active competition than had been the case for some weeks back; prices in consequence hardened, and for Feathers of good quality an advance of fully 5 per cent. must be quoted.

The total value of Ostrich Feathers sold on the public market this week amounted to £3,400 18s. 1d., and weighed 3,727 lbs. 2½ozs., averaging £1 14s. 2½d. per lb.

Wool.—The London sales opened on Tuesday last. Our cable conveying news of the opening reads as follows: "Greasy Cape Combing 5 per cent. dearer, others and snow-whites no change in prices." This news has strengthened the local market without causing any quotable improvement in prices. The amount of business done during the week was small owing to limited stocks; the only sale of importance was made by ourselves, some 600 bales, for which we secured extreme prices.

Mohair.—There is no new feature to report in this market. Summer Kids are quite neglected, and but little has been done in other sorts this week. Our sales of 200 bales, chiefly Firsts, with some Winter and mixed Free State Hair, were the only sales of any consequence made. The present stock of unsold Hair will not exceed 3,000 bales, of which about 1,000 bales is Kids Hair.

Skins.—We sold Sheepskins this week at 5d in bundles; Pelts, 3½d, Capes, 1s 2½d; damaged, 5½d each; Angoras, 5½d; Shorn, 4½d; damaged, 2½d; Goat, 11½d; damaged, 5½d per lb; Springbok, 9d each.

Hides.—We sold this week sundried Hides at 7d and for damaged 5½d; Drysalted 6½d and Thirds 4d.

Horns.—We sold parcels all round at 3½d each.

EAST LONDON.

Messrs. Dyer & Dyer, Limited, report under date September 18:—

Wool.—The London Sales opened on Tuesday, 16th inst., the attendance being large, and the tone of the market firm. As compared with last season's closing rates, prices were unchanged. Later cables report an improvement of ¼d in fine combing grease, and advise a weaker demand for inferior and wasty lots. The position of the wools in which buyers up country are interested is practically unaltered. Purchasing therefore can be continued on the basis of the quotations given in last circular, and which are repeated to-day. No sales of importance have been put through locally during the past week.

Mohair.—A firmer tone pervades the market for this staple. In the absence of supplies (of the new clip), it has not been possible to make a test sale, but no change in values recently quoted is anticipated when the first consignments are placed on the market.

Hides and Skins.—Although showing no improvement in values, sheepskins in sympathy with wool are decidedly firmer to-day. The demand for heavyweight Hides is good, and Goatskins remain a saleable line.

Grain.—There is no change to report in the market. Supplies of seed Mealies and Kaffir Corn are very small, and prices are well maintained.

Rinderpest.

The following approximate returns show, with regard to the districts named: (a) number of centres infected on the 20th ult. (b) total number of animals in the districts infected (c) percentage of deaths:

	A.	B.	C.
Aliwal North	6	*	*
Albert	5	199	11·5
Barkly East	13	1,018	34·4
East London	3	180	7·2
Elliot	9	499	21·4
Engcobo	9	1,225	10·3
Glen Grey	7	306	13·7
Hay	3	187	2·13
Herschel	12	4,389	13·8
Herbert	5	431	16·7
Kimberley	1	16	20·3
Maclear	7	*	*
Mafeking	2	6,488	24·
Taungs	1	3,011	16·6
Umtata	1	36	44·
Vryburg	1	8	37·5
Wodehouse	27	1,200	12·5
Xalanga	3	49	12·2

* Full statistics not yet furnished.

GOVERNMENT NOTICES.

Farmers' Apprentices. Dairy Assistants, &c.

As inquiries are from time to time received from young men from abroad as to where they may serve apprenticeship or gain practical experience of farming in this Colony, before starting on their own account, the Secretary for Agriculture invites Farmers who are willing to receive young men of good character, for this purpose, to register their names with the Under Secretary for Agriculture, stating the class of farming they do, how many young men they are prepared to take, and for what period they would enter into an agreement.

It is not probable that these young men will be in a position to give more than their free services in return for the experience they will gain; that is, they will not be able to pay any fee; and they will look to receiving free board and lodging in return for their services.

It is to Farmers, therefore, who are willing to grant such young men free board and lodging in return for services rendered, that this application is especially addressed.

With reference to the above notice to Farmers, the Secretary for Agriculture now invites young men who are willing to engage themselves as Farmers' Apprentices in Cape Colony to register their names with the Under Secretary for Agriculture, Cape Town. The apprentice will gain experience in farming in South Africa, and have an opportunity for spying out the land before starting on his own farm. To the new comer from another country this is essential, for he has much to learn and unlearn.

Many applications for such Apprentices have been received from Farmers in the Colony. It will be noted that the Apprentice will neither receive wages, nor pay a fee. He will get free board and lodging in return for his services, and at the same time acquire the experience he is in need of.

Applications for employment have also been received from several Lady Dairy Experts and Dairy Assistants; and Dairy Farmers and others desiring to avail themselves of the services of such are invited to register their names with this Department, giving particulars as to situation and extent of operations, etc. and salary and other emoluments they are prepared to offer.

The Outbreak of Rabies.

By command of H.E. the Governor the following Proclamation No. 163 of September 4th, 1902 is published in the *Government Gazette*.

Under and by virtue of the powers and authorities vested in me by Act No. 27 of 1893, entitled the "Animal Diseases Act 1893," I do hereby proclaim, declare and make known that whereas it has been represented to me that the disease known as RABIES is prevalent among Dogs in Southern Rhodesia the introduction of all Dogs and other Carnivora and Monkeys from Southern Rhodesia or from the Bechuanaland Protectorate into this Colony shall be and is hereby prohibited, and that all Dogs and other Carnivora and Monkeys which may enter or be introduced into this Colony in contravention of this Proclamation shall be liable to be destroyed.

And I do hereby declare that this Proclamation shall have effect from and after the date hereof, and shall continue in force until amended or repealed.

And I do strictly charge every Resident Magistrate, Field-cornet and Justice of the Peace to see that this Proclamation is obeyed, and to bring to justice any person who may contravene the same.

Cattle from German South-west Africa.

By Command of H.E., the Governor, the following Proclamation, No. 122 of 1901, is published :—

Under and by virtue of the powers vested in me by Act No. 47 of 1893 and Act No. 2 of 1897, I do hereby proclaim, declare and make known that notwithstanding anything contained in the Proclamation, No. 18, bearing date January 21, 1901, it shall and may be lawful, from and after the date hereof, to introduce Horned Cattle into this Colony from that portion of the Territory of German South West Africa, which lies south of the Quarantine Belt established by the Government of the said Territory at about the 21th parallel of South Latitude, subject to the Regulations contained in the Schedule hereto.

GOD SAVE THE KING.

Given under my hand and the Public Seal of the Colony of the Cape of Good Hope, this 15th day of July, 1901.

WALTER HELY-HUTCHINSON,
(Governor.

By Command of His Excellency the Governor in Council,
P. H. FAURE.

Schedule to foregoing Proclamation..

(1). The person in charge of the cattle introduced under this Proclamation shall obtain and have in his possession a certificate in the form set forth in Annexure "A" hereto, issued and signed by a competent and responsible Officer or person delegated for this purpose by the Government of German South West Africa.

(2) The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, to any Field-cornet, Police Officer or owner of land which the cattle may pass or be passing.

(3) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding Fifty Pounds Sterling, or in default of payment to imprisonment with or without hard labour for any period not exceeding Three Months unless such fine be sooner paid.

ANNEXURE "A."

I do hereby certify that the undermentioned cattle have not come from a locality north of the Quarantine Belt established by the Government of German South West Africa about the 21th parallel of South latitude, nor from a locality in which contagious disease is known to exist, and that they are free from disease, viz : --

Number and general description)
of cattle and place from) ..
which sent. }

Owner's name and address.

Name of person in charge.

Place in Cape Colony to)
which cattle are being) ..
sent. }

Signature of Official of German
Government.

Title.....

Place ..

Date.....

Cattle from Queensland, United States of America and Argentina.

REGULATIONS FOR IMPORTATION.

By command of His Excellency the Governor, the following Proclamation No. 138, 1902, is published in the *Government Gazette* —

Under and by virtue of the powers and authorities vested in me by the provisions of Act No. 27 of 1893, entitled "The Animal Diseases Act, 1893," I do hereby proclaim, declare and make known that, in terms of Section 6 and 7 of the Act aforesaid, I have issued and do hereby issue the following Regulations, as set forth in the Schedule hereunto annexed, regarding the importation or introduction of cattle into this Colony from the State of Queensland (Australia), the United States of America and Argentina.

And I do hereby declare that these Regulations shall have effect from and after the 1st September, 1902, and shall continue in force until amended or repealed.

Schedule to foregoing Proclamation.

REGULATIONS REGARDING THE IMPORTATION OF CATTLE FROM QUEENSLAND, UNITED STATES OF AMERICA AND ARGENTINA.

1. Cattle from the abovementioned countries may be landed at the Ports of East London and Port Elizabeth, subject to inspection and issue of Clean Certificate at such port as provided by law.

2. Such Cattle may also be landed at the Ports of Cape Town and Mossel Bay, provided they are accompanied by a Certificate in the subjoined form.

CERTIFICATE.

I do hereby certify that the undermentioned cattle are free from disease, and have not come from a locality in which the disease known as Redwater, Texas Fever, Tick Fever, or Tristeza is indigenous, and in which healthy cattle from non-infected areas are liable to become infected with the said disease.

Number and general description of cattle.....

Place from which cattle have come.....

Name of consignee at Cape Town or Mossel Bay.....

Signature.....

Title..

Place

Date.....

Redwater in Rhodesia.

PROHIBITION OF INTRODUCTION OF CATTLE FROM SOUTHERN RHODESIA.

By command of His Excellency the Governor the following Proclamation No. 139, 1902, is published in the *Government Gazette*:—

Whereas the disease known as Redwater is prevalent amongst cattle in Southern Rhodesia:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of cattle from Southern Rhodesia into any part of this Colony shall be and is hereby prohibited, and that all cattle which may enter this Colony in contravention of this Proclamation shall be liable to be destroyed.

And I hereby declare that this Proclamation shall have effect from and after the date hereof, and shall continue in force until amended or repealed.

And I do strictly charge every Resident Magistrate, Field-cornet and Justice of the Peace to see that this Proclamation is obeyed, and to bring to justice any person who may contravene the same.

*To be signed by an Officer specially authorized to perform the duty by the Government or State Administration of the country from which the cattle are shipped.

Prohibition of the Importation of Grass Hay from Southern Rhodesia.

By Command of H.E., the Governor, the following Proclamation, No. 166, of September, 10th, 1902, is published in the *Government Gazette*:—

Under and by virtue of the powers and authorities vested in me by Act No. 9 of 1876, intituled "Act to regulate the introduction into this Colony of articles or things which by reason of disease or otherwise might be injurious to the interests thereof," I do hereby proclaim, declare and make known that whereas the infection of Redwater may be conveyed by means of Grass Hay, the importation of Grass Hay from Southern Rhodesia, or from the Bechuanaland Protectorate, shall be and is hereby prohibited; and that all Grass Hay which may enter or be introduced into the Colony in contravention of this Proclamation shall be liable to be destroyed.

And I do hereby declare that this Proclamation shall have effect from and after the date of publication hereof, and shall continue in force until amended or repealed.

And I strictly charge every Resident Magistrate, Field-cornet and Justice of the Peace to see that this Proclamation is obeyed, and to bring to justice any person who may contravene the same.

Rinderpest Regulations.

The following Regulations have been proclaimed by H.E. the Governor under Act No. 2, 1897. (The Animals Diseases Rinderpest, Amendment Act, 1897).:—

PROCLAMATION, No. 151, AUGUST 28RD, 1902:

It shall not be lawful for public sales of horned cattle to be held in the District of Wodehouse.

PROCLAMATION, No. 152, AUGUST 28RD, 1902:

1. From and after the date hereof it shall not be lawful to remove from any portion of the District of Wodehouse into the adjoining Districts of Queen's Town and Glen Grey any horned cattle or the carcasses, hides, biles or any other portions of such cattle.

2. Any person contravening the provisions of this my Proclamation shall, on conviction, be liable to forfeit any sum not exceeding one hundred pounds (£100) sterling, and in default of payment thereof to imprisonment with or without hard labour for any period not exceeding six months, unless the fine be sooner paid.

3. And I do strictly charge every Resident Magistrate, Field-cornet, Justice of the Peace, and Inspector of Native Locations to see that this Proclamation is obeyed, and to bring to justice any person who may contravene the same.

PROCLAMATION, No. 162, SEPTEMBER 4TH, 1902:

Under and by virtue of the powers in me vested by the Animal Diseases Act No. 27 of 1893, and the Animal Diseases Rinderpest Amendment Act No. 2 of 1897, I do hereby proclaim, declare and make known that, owing to the existence therein of the disease amongst cattle known as Rinderpest, the areas named in the Schedule hereto shall be deemed to be areas infected with Rinderpest, from which areas, it shall not be lawful, from and after the date hereof, to remove into the Transkeian Territories any horned cattle or the carcasses, hides, biles or any other portions of such cattle.

Any person contravening the provisions of this my Proclamation shall, on conviction, be liable to forfeit any sum not exceeding one hundred pounds (£100) sterling, and in default of payment thereof to imprisonment with or without hard labour for any period not exceeding six months, unless the fine be sooner paid.

And I do strictly charge every Resident Magistrate, Field Cornet, Justice of the Peace, and Inspector of Native Locations to see that this Proclamation is obeyed, and to bring to justice any person who may contravene the same.

Schedule to foregoing Proclamation.

Districts of Barkly East, Glen Grey and Wodehouse.

PROCLAMATION No. 164, SEPTEMBER 8TH, 1902 :

It shall not be lawful for public sales of horned cattle to be held in the Districts of Albert, Aliwal North, Barkly East, Herschel and Elliot.

PROCLAMATION No. 173. SEPTEMBER, 15TH 1902 :

It shall not be lawful for Horned Cattle, in the Districts of Aliwal North, Barkly East, Glen Grey, Herschel and Wodehouse, to be removed beyond the limits of the respective Districts or, except upon the written permission of the Resident Magistrate of the District, from place to place within those Districts.

Rinderpest.

COMPULSORY INOCULATION.

By command of His Excellency the Governor, the following Proclamation No. 108, 1902, is published in the *Government Gazette* :—

Under and by virtue of the powers and authorities vested in me by the provisions of Act No. 2 of 1897, entitled "The Animals Diseases Rinderpest Amendment Act, 1897," I do hereby proclaim, declare and make known that I have issued and do hereby issue the following Regulations, as set forth in the Schedule hereunto annexed, for arresting the spread of Rinderpest.

And I do hereby further proclaim and make known that any person contravening any of the said Regulations shall be liable to a fine not exceeding fifty pounds, or in default of payment thereof to imprisonment with or without hard labour for any period not exceeding three months, unless such fine be sooner paid.

Schedule to foregoing Proclamation.

1. When Rinderpest has either already appeared or hereafter appears in any part of this Colony, all cattle which are infected with the disease or which may be in contact with infected cattle shall be forthwith inoculated either with serum or with glycerinated bile.

2. The inoculation shall be performed by the owner or person in charge of the cattle, or if he fail to do so, by a duly authorized officer of the Government, and the cost of the inoculation shall be borne by the owner or person in charge of the cattle.

3. No person shall, without the special permission of the Secretary for Agriculture, perform inoculation against Rinderpest with the pure bile or with virulent blood of animals affected with Rinderpest.

Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined Regulation for checking the spread of the infection is republished.

REGULATION ISSUED UNDER PROCLAMATION No. 30, DATED 20TH JANUARY, 1899.

Whenever under the provisions of Sections 11 and 12 of Act No. 27 of 1893, any area is declared or proclaimed to be an area infected with Rinderpest, it shall not be lawful for any person, animal, animal produce, article or thing, who or which may, in the opinion of the Magistrate of the District in which such area is situated, be liable to convey infection of Rinderpest, to leave or to be removed therefrom.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM BASUTOLAND.

By command of His Excellency the Governor the following Proclamation No. 63, 1902, was published in the *Government Gazette* of April 22nd, 1902 :—

Under and by virtue of the powers vested in me by the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," and the Act No. 2 of 1897, entitled the "Animal Diseases Rinderpest Amendment Act, 1897," I do hereby proclaim, declare and make known that, whereas the disease known as Rinderpest is prevalent amongst cattle in Basutoland, it shall not be lawful, from and after the date hereof, to introduce or to cause or allow Horned Cattle to be introduced from Basutoland into any part of this Colony, save and except cattle in yoke and accompanied by a certificate, to be obtained and held by the person in charge of such cattle, signed by a competent and responsible officer, to the effect that such cattle are free from infectious or contagious disease and have not been in contact with infected animals or come from a locality where any such disease shall be known to exist.

And I do hereby proclaim and make known that all Horned Cattle which may enter this Colony in contravention of this Proclamation shall be liable to be destroyed.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM ORANGE RIVER COLONY AND THE TRANSVAAL.

By command of His Excellency the Governor, the following Proclamation No. 139, 1901, was published in the *Government Gazette* of August 16th, 1901 :—

Under and by virtue of the powers vested in me by the "Animal Diseases Act," No. 27 of 1893, and by the "Animal Diseases Rinderpest Amendment Act," No. 2 of 1897, I do hereby proclaim, declare and make known that it shall not be lawful, from and after the date hereof, to introduce or to cause or allow Horned Cattle to be introduced into any part of this Colony from the Orange River Colony and the Transvaal, save and except such cattle as may be required to be introduced by the Government for the purpose of supplying Bile or Serum for inoculation against Rinderpest :

And I do hereby proclaim and make known that all Horned Cattle which may enter this Colony in contravention of this Proclamation shall be liable to be destroyed.

And I do hereby further declare that this Proclamation shall have effect from and after the date hereof, and shall continue in force until amended or repealed.

Proclamation No. 217, bearing date the 29th day of October, 1900, together with the regulations issued thereunder, is thereby repealed.

And I do strictly charge every Resident Magistrate, Field-cornet and Justice of the Peace to see that this Proclamation is obeyed, and to bring to justice any person who may contravene the same.

Fly Netting for Fruit Trees.

With reference to notice dated 9th June, it is hereby notified that the Board has still a quantity of fly or mosquito netting for disposal. Applications for same should be addressed to the undersigned.

Cost from 7s. to 8s. per piece, 120 ft. by 70 ins.

C. MAYER, Secretary.

Western Province Board of Horticulture,
Stellenbosch, 1st September, 1902.

Locust Disease Fungus.

The attention of landowners and others is drawn to the provisions of Government Notice No. 1123 of 1897, wherein it is notified for general information that supplies of Locust Disease Fungus may be obtained from the Director of the Bacteriological Institute, Graham's Town, at a cost of sixpence per tube to all applicants residing in the Colony. Applicants beyond the borders of the Colony are required to pay the cost of postage in addition to the amount charged.

As the Fungus is cultivated on a moist jelly and is therefore liable to become dried up and useless if kept long on hand, it is not found possible to store supplies in the various districts of the Colony; and applicants desirous of trying the Fungus should therefore submit their applications, with a remittance for the quantity applied for, *direct* to the Director, who can always supply the Fungus in proper condition and on short notice.

Lung-Sickness.

INTRODUCTION OF CATTLE FROM OVER THE ORANGE RIVER.

By command of His Excellency the Governor, the following Proclamation was published in the *Government Gazette* of the 30th October, 1900:—

Whereas by virtue of the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," it is enacted that it shall be lawful for the Governor by Proclamation in the *Gazette*, to prohibit the importation or introduction into this Colony from any place beyond the same in which any infectious or contagious disease affecting animals shall be known or be supposed to be prevalent, of any such animals as in such Proclamation shall be mentioned

And whereas the disease known as Lung-sickness (Pleuro-pneumonia) is prevalent amongst cattle in the Transvaal and the Orange River Colony:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of Cattle from the Transvaal and the Orange River Colony, save by road by way of Aliwal North, Bethulie Bridge or Norval's Pont, and subject to the regulations set forth in the Schedule hereto, shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Schedule to the foregoing Proclamation.

(1) No cattle shall be introduced into this Colony from the Transvaal or the Orange River Colony by railway.

(2) No cattle shall be introduced into this Colony from the Transvaal and the Orange River Colony by road,

(a) Unless the person in charge of such cattle shall have obtained and have in his possession a certificate with regard to such cattle, in the form set forth in Schedule A hereto, signed by a competent and responsible officer or person delegated for this purpose by the Government of the Transvaal or the Orange River Colony, and

(b) Unless such certificate shall have been countersigned or endorsed by the Inspector appointed for this purpose by the Colonial Government at Aliwal North, Bethulie Bridge, or Norval's Pont.

(3) No person intending to introduce cattle from the Transvaal or the Orange River Colony, shall be permitted to introduce such cattle unless he shall have obtained the aforesaid endorsement, and he shall, with that view, give timely notice to the Inspector, stating the number of cattle and the place, within 3 miles of Aliwal North, Bethulie Bridge and Norval's Pont, where the cattle may be inspected, and the proposed time of introduction; and upon receipt of such notice the Inspector shall proceed at the time and to the place specified in such notice, or as soon thereafter as may be possible, then and there to examine such cattle.

(4) The person in charge of such cattle shall be bound to produce the certificate aforesaid to the Inspector, and such Inspector shall, if the certificate be in order, and the cattle be free from disease, make an endorsement on the certificate in the form given in Schedule "B" hereto, and the cattle may thereafter proceed on their way. The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, duly endorsed, to any Field-Cornet, Police Officer or owner of land over which the cattle may pass or be passing.

(5) In the absence of the Certificate prescribed in regulation (2) the cattle shall be quarantined for a period not less than twenty-one days at some place on the north bank of the Orange River and in the neighbourhood of Aliwal North, Bethulie Bridge and Norval's Pont where they may be inspected by an Officer of the Colonial Government, appointed for the purpose, at such intervals as may be considered necessary.

(6) On the expiration of the period of quarantine the Inspector, should he be satisfied that the cattle are free from disease, shall issue a Certificate in the form set forth in Schedule C hereto.

(7) The person in charge of such cattle as are referred to in the Certificate mentioned in regulation (6) is liable to be called upon to produce such Certificate to any Field-Cornet, Police Officer or owner of land over which such cattle may pass or be passing.

(8) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for any period not exceeding three months unless such fine be sooner paid.

SCHEDULE A.

I hereby certify that the undermentioned Cattle either have not mixed with and Cattle affected with Lung sickness and are free from disease : or have been effectively inoculated against Lung-sickness and are free from disease, viz. :—

Number and general	.....
description of	.....
Cattle	.....
Owner's name and	.....
address	.....
In charge of.	.....
Place to which Cattle are being sent.	.....
	(Signature).....
	(Address).....
Date.....	

SCHEDULE B.

(Endorsement to be made by the Inspector.)

I hereby certify that I have examined the Cattle to which this Certificate refers and find them to be free from disease.

	(Inspector's Signature).....
	Address).....
Date.....	

SCHEDULE C.

I hereby certify that the Cattle to which this Certificate refers have undergone a period of quarantine for at least twenty-one days, that I have examined them and find them to be free from disease, viz. :—

Number and general	.....
description of	.....
Cattle	.....
Owner's name and	.....
address	.....
In charge of.	.....
Place to which Cattle are being sent.	.....
	(Inspector's signature).....
	(Address).....
Date.....	

RAINFALL, AUGUST, 1902.

NOTE: n.r. denotes that, up to the date of publication, Returns have *not* been received from those Stations.

I. CAPE PENINSULA:		INCHES.	II. SOUTH-WEST—continued.		INCHES
Royal Observatory, 12 inch gauge ..	..	3.88	Montagu ..	..	2.02
Cape Town, Town House (Fire Station) ..	..	3.90	De Hoop (Div. Robertson) ..	..	2.41
Cape Town, South African College ..	..	5.19	Weltevreden (Groot Drakenstein) ..	..	9.23
Do Sea Point Hall ..	..	4.10	Do. (Div. Caledon) ..	..	5.92
Do Molteno Reservoir ..	..	4.24	Danger Point ..	..	5.94
Do Platteklip ..	..	6.43	Vergeboom's River ..	..	9.41
Do Signal Hill ..	..	3.64	Bethlehem (Stellenbosch) No. 1 ..	..	14.14
Table Mountain, Disa Head ..	..	5.14	" No. 2 ..	..	12.07
Do Kasteel's Poort ..	..	8.17	De Doorns ..	..	2.43
Do Waai Kopje ..	..	11.48	III. WEST COAST:		
Do St. Michael's ..	..	10.85	Port Nolloth ..	..	0.20
Devil's Peak, Block House ..	..	8.84	Do. (Christensen) ..	..	n.r.
Do Nursery Gauge ..	..	7.18	Klipfontein ..	..	1.09
Do Lower Gauge ..	..	6.82	Kraaifontein ..	..	n.r.
Newlands (Montebello) ..	..	11.60	O'okiep ..	..	0.99
Bishopscourt ..	..	n.r.	Springbokfontein (Gaal) ..	..	1.34
Claremont ..	..	n.r.	Concordia ..	..	n.r.
Kenilworth ..	..	9.75	Garies ..	..	n.r.
Wynberg (St. Mary's) ..	..	10.01	Kersefontein ..	..	3.33
Groot Constantia ..	..	7.63	The Towers ..	..	3.75
Tokai ..	..	7.88	Dassen Island ..	..	2.68
Simon's Town (Wood) ..	..	n.r.	Malmesbury ..	..	n.r.
Do. (Gaal) ..	..	6.90	Piquetberg ..	..	n.r.
Blaauwberg Strand ..	..	1.87	Van Rhynsdorp ..	..	n.r.
Robben Island ..	..	3.75	Clanwilliam (Gaal) ..	..	1.87
Strandfontein ..	..	4.10	Do. (Seydell) ..	..	1.91
Camp's Bay ..	..	3.15	Welbedacht ..	..	n.r.
II. SOUTH WEST:			Hopefield ..	..	2.78
Eerste River ..	..	6.00	Lilyfontein ..	..	n.r.
Klapmuts ..	..	7.86	Zoutpan ..	..	2.42
Stellenbosch (Gaal) ..	..	7.90	Wupperthal ..	..	3.92
Somerset West ..	..	5.93	IV. SOUTH COAST:		
Paarl ..	..	10.67	Cape L'Agulhas ..	..	4.49
Wellington (Gaal) ..	..	6.21	Bredasdorp ..	..	5.15
Do. (Huguenot Seminary) ..	..	5.14	Swellendam ..	..	8.08
Delta ..	..	n.r.	Heidelberg ..	..	2.49
Tulbagh ..	..	3.36	Riversdale ..	..	2.98
Kluitjes Kraal ..	..	5.52	Herbertsdale ..	..	n.r.
Houw Hoek ..	..	n.r.	Dumbe Dykes ..	..	1.41
Ceres ..	..	9.39	Mossel Bay ..	..	3.48
Ceres Road ..	..	3.75	George ..	..	9.46
Rocklands ..	..	4.39	Ezelzagt ..	..	3.41
Caledon ..	..	4.85	Millwood ..	..	n.r.
Worcester (Gaal) ..	..	2.16	Sour Flats ..	..	n.r.
Do. (Meiring) ..	..	n.r.	Concordia ..	..	n.r.
Do. Station ..	..	1.51	Krystna ..	..	6.13
Hax River ..	..	3.19	Buffels Nek ..	..	n.r.
Lady Grey (Div. Robertson) ..	..	2.09	Harkerville ..	..	n.r.
Robertson ..	..	1.99	Plettenberg Bay ..	..	5.63
Robertson (Govt. Plantation) ..	..	n.r.	Forest Hall ..	..	n.r.
			Blaauwkrantz ..	..	6.60

IV. SOUTH COAST—*continued*. INCHES.

Storm's River	8 62
Witte Els Bosch	10 56
Humansdorp	8 37
Cape St. Francis	6 92
Hankey	5 40
Witteklip	7 32
Van Staaden's (upper)	9 93
Do. (lower)	11 59
Uitenhage	7 51
Do. (Inggs)	n.r.
Dunbrody	1 01
Port Elizabeth (Harbour)	4 68
Walmer Heights (near Port Elizabeth)	9 04
Tankatara	1 94
Lottering	7 97
Shark's River (Nursery)	6 10
Do (Convict Station)	n.r.
Grootvader's Bosch	n.r.
Karmmelks Rivier	4 86
Zuurbrak	4 08
Melkhoutfontein	2 03
Vogel Vlei	4 07
Kruis River	4 84
Centlivres	7 78

. SOUTHERN KARROO :

Touws River (D. E.'s Office) ..	2 12
Ladismith	1 91
Amalienstein	2 45
Calitzdorp	0 05
Oudtshoorn	1 35
Vlakte Plaats	0 73
Uniondale	1 25
Kleinpoort	2 80
Glencannon	0 00
Pietermeintjes	2 93
Verkeerde Vlei	1 81
Triangle	1 36
Grootfontein	0 73
Bok River	3 48

VI. WEST CENTRAL KARROO :

Matjesfontein	2 08
Fraserburg Road	2 17
Prince Albert	n.r.
Do. Road	n.r.
Zwartberg Pass	3 19
Beaufort West	0 36
Dunedin	n.r.
Nel's Poort	0 17
Camfer's Kraal	0 26
Lower Nel's Poort	0 20
Baaken's Rug	n.r.
Willowmore	1 44
Steytlerville	3 70
Rooplaats	n.r.
Laingsburg	0 91

VII. EAST CENTRAL KARROO :

Aberdeen (Gaol)	0 91
Do. (Bedford)	1 08
Aberdeen Road	1 04
Rietfontein	1 70

VII. E. C. KARROO—*continued* INCHES.

Winterhoek	n.r.
Klipdrift (De Erf)	0 52
Kendrew (Holmes)	0 83
Graaff-Reinet	0 70
Do. (College)	0 67
Do. (Engineer's Yard)	0 67
New Bethesda	0 25
Roo de Bloem	0 86
Wellwood	n.r.
Do. Mountain	n.r.
Jansenville	1 04
Patryfontein	n.r.
Toege dacht	0 84
Klipfontein	0 49
Cranemere	0 44
Pearston	0 32
Fredenberg	n.r.
Somerset East	1 19
Do. (College)	1 25
Longhope	n.r.
Middelton	n.r.
Corndale (Div. Aberdeen)	n.r.
Cookhouse	n.r.
Doornbosch, Zwagershoek	n.r.
Middelwater	1 42
Darlington	n.r.
Bloemhof	0 85
Arundale	0 54

VIII. NORTHERN KARROO :

Calvinia	n.r.
Middlepost	n.r.
Sutherland	1 14
Rheboksfontein	n.r.
Fraserburg	n.r.
Onderste Doorns	n.r.
Droogfontein	n.r.
Gannapan	n.r.
Carnarvon	0 03
Wagenaar's Kraal	0 05
Brakfontein	n.r.
Vogelstruisfontein	n.r.
Victoria West	0 00
Britstown	0 08
Murraysburg	0 00
De Kruis	0 24
Richmond	n.r.
De Aar	n.r.
Middlemount	n.r.
Hanover	0 00
Philip's Town	0 08
Boschfontein	0 00
Petrusville	0 00
The Willows	n.r.
Naauwpoort	n.r.
Middelburg (Begley)	0 00
Golesberg	0 01
Tafelberg Hall	n.r.
Rietbult (Colesberg Bridge)	n.r.
Stonehills	0 00
Craddock	0 04
Do. (Penny)	0 00
Varsch Vlei	n.r.
Witmoos	0 18

VIII. N. KARROO—continued

	INCHES.
Steynsburg ..	0.13
Do. (Nesemann) ..	0.12
Daggaboer's Nek ..	n.r.
Springfield ..	n.r.
Quagga's Kerk ..	n.r.
Tarkastad ..	0.22
Drummond Park ..	0.00
Riet Vlei ..	0.15
Brand Vlei ..	n.r.
Williston ..	n.r.
Omdraai's Vlei ..	n.r.
Zwagersfontein ..	n.r.
Varken's Kop ..	0.10
Oulmstock ..	n.r.
Doorskuilen ..	n.r.
Houwater Dam ..	n.r.
Hillmoor ..	0.09
Glen Roy ..	n.r.
Fish River ..	n.r.
Spitzkop ..	0.36
Phizantefontein ..	n.r.
Biesjesdam ..	0.20
Groot Vley, Theebus ..	n.r.
Kleinhaasfontein ..	0.60
Scorpion's Drift ..	0.00
Beyersfontein ..	0.10
Zeekoegat ..	0.00
Haasfontein ..	0.24

IX. NORTHERN BORDER:

Pella ..	n.r.
Kenhardt ..	n.r.
Van Wyk's Vlei ..	0.09
Prieska ..	n.r.
Dunmurry ..	0.00
Griqua Town ..	0.03
Campbell ..	0.00
Douglas ..	0.00
Arcoa (Herbert) ..	0.00
Eskdale ..	0.00
Hopetown ..	0.00
Orange River ..	0.00
Newlands (Afd. Barkly West) ..	0.31
Groot Boetsap ..	n.r.
Kimberley (Gaol) ..	0.07
Do. (Stephens) ..	0.07
Beaconsfield ..	n.r.
Bellsbank (Div. Barkly West) ..	n.r.
Grootdrink ..	n.r.
Barkly West ..	0.15
Upington ..	0.00
Trooipspan ..	n.r.
New Year's Kraal ..	0.02

X. SOUTH-EAST:

Melrose ..	0.23
Varken's Kuil (Div. Bedford) ..	n.r.
Fairholt ..	0.37
Cheviot Fells (Bedford) ..	n.r.
Alcedale ..	1.06
Bedford (Gaol) ..	0.77
Do. (Hall) ..	n.r.
Sydney's Hope ..	1.9J
Cullendale ..	n.r.

X. SOUTH-EAST—continued.

	INCHES
Adelaide ..	0.47
Atherstone ..	2.92
Alexandria ..	5.45
Salem ..	n.r.
Graham's Town (Gaol) ..	3.23
Do. (Bact. Inst.) ..	2.68
Heatherton Towers (near Graham's Town) ..	0.05
Fort Beaufort ..	0.86
Katberg ..	n.r.
Balfour ..	1.02
Seymour ..	0.46
Glencairn ..	n.r.
Alice ..	0.52
Lovedale ..	n.r.
Port Alfred ..	6.06
Hogsback ..	n.r.
Thaba N'doda ..	n.r.
Reddie ..	1.96
Cathcart ..	0.42
Kelskama Hoek ..	0.80
Dynamite (Crawley) ..	0.89
Thomas River ..	0.00
King William's Town ..	0.62
Do. Hospital ..	0.88
Stutterheim (Wylde) ..	1.72
Do. (Besté) ..	1.49
Dohne ..	n.r.
Kubusie ..	n.r.
Dlaney ..	n.r.
Kai Road ..	n.r.
Evelyn Valley ..	n.r.
Berlin ..	n.r.
Isidenge ..	n.r.
Pirie Forest ..	n.r.
Quacu Forest ..	n.r.
Kologha ..	n.r.
Fort Jackson ..	n.r.
Komgha ..	1.47
Prospect Farm (Div. Komgha) ..	n.r.
Hopewell Do. ..	n.r.
East London, West ..	2.48
Do. East ..	n.r.
Fountain Head ..	n.r.
Fort Cunynghame ..	n.r.
Katberg Sanatorium ..	1.61
Cuylerville ..	n.r.
Belo ..	1.72
Fort Fordyce ..	n.r.
Daggaboer's Nek ..	0.64
Lynedoch ..	0.63
Sunnyside ..	2.62
Scott's Bottom ..	3.86
Chiselhurst ..	6.46

XI. NORTH-EAST:

Venterstad ..	0.05
Ellasmere ..	0.02
Burnley, Cypherget ..	n.r.
Burgtersdorp ..	0.07
Do. (Le Roos) ..	n.r.
Molteno Station ..	n.r.
Cypherget ..	0.20
Thibet Park ..	0.64

XI. NORTH-EAST— <i>continued.</i>			INCHES.	XII. KAFFRARIA— <i>continued.</i>			INCHES
Sterkstroom ..	..	n.r.		Elliotdale ..	..	0.97	
Do. (Veitch) ..	..	n.r.		Mqanduli ..	..	n.r.	
Rocklands ..	..	0.26		Matatiele ..	..	n.r.	
Aliwal North (Gaol) ..	..	0.00		Umtata ..	..	0.52	
Do. (Brown) ..	..	0.08		Qumbu ..	..	n.r.	
Rietfontein ..	..	0.20		Kokstad ..	..	1.13	
Buffelsfontein ..	..	n.r.		Port St. John's ..	..	n.r.	
Hex's Plantation ..	..	n.r.		Umzimkulu ..	..	1.75	
Carnarvon Farm ..	..	0.22		Woodcliff ..	..	0.34	
Jamestown ..	..	0.50		Tabankulu ..	..	1.05	
Queenstown (Gaol) ..	..	0.23		Kilrush ..	..	1.67	
Do. (Beswick) ..	..	n.r.		Somerville (Div. Tsolo) ..	..	1.26	
Dordrecht ..	..	n.r.		Tsomo ..	..	0.47	
Tyden ..	..	n.r.		Bazoya ..	..	2.26	
Snow Hill ..	..	n.r.		Quebe ..	..	4.97	
Herschel ..	..	0.10		Seteba ..	..	1.32	
Lady Grey ..	..	n.r.		Flagstaff ..	..	1.45	
Bolotwa (Contest) ..	..	0.33		Insikeni ..	..	2.73	
Lady Frere ..	..	0.17					
Avoca (Div. Barkly East) ..	..	n.r.		XIII. BASUTOLAND :			
Kellands ..	..	0.55		Mafeteng ..	..	0.00	
Barkly East ..	..	0.44		Mohalie's Hoek ..	..	0.26	
Glenlyon ..	..	n.r.		Qacha's Nek ..	..	1.67	
Gateshead ..	..	n.r.		Moyeni Quthing ..	..	0.68	
Lyndene ..	..	0.12		Teyateyaneng ..	..	0.19	
Mooifontein ..	..	0.06		Leribe ..	..	n.r.	
Poplar Grove ..	..	0.47		Buttha Buthe ..	..	n.r.	
Biesjesfontein ..	..	n.r.		Maseru ..	..	n.r.	
Whittlesea ..	..	0.36					
Halseston ..	..	0.10		XIV. ORANGE RIVER COLONY :			
Middlecourt ..	..	0.18		Bethulie ..	..	0.00	
Doornkop ..	..	1.13		Kroonstad ..	..	0.02	
Blikana ..	..	0.62					
Table Hill ..	..	0.98		XV. NATAL :			
				Durban, Observatory ..	..	3.90	
XII. KAFFRARIA :							
Slaate, Xalanga ..	..	n.r.		XVI. TRANSVAAL :			
Ida, Xalanga ..	..	n.r.		Johannesburg ..	..	n.r.	
Caia, Xalanga ..	..	n.r.		Do. Cemetery ..	..	n.r.	
Cofimvaba ..	..	n.r.					
Nqamakwe ..	..	1.20		XVII. BECHUANALAND :			
Main ..	..	0.52		Vryburg ..	..	0.00	
Engcobo ..	..	n.r.		Taungs ..	..	0.06	
Butterworth ..	..	0.82					
Kentani ..	..	0.39		XVIII. RHODESIA :			
Maclear ..	..	n.r.		Salisbury ..	..	n.r.	
Idutywa ..	..	0.52		Hope Fountain ..	..	0.00	
Willowvale ..	..	1.33		Geelong ..	..	n.r.	
Mount Fletcher ..	..	1.48					

CURRENT MARKET RATES OF AGRICULTURAL PRODUCE.

The following Table of Current Market Rates (Wholesale) of Agricultural Produce on Saturday, 20th September, 1902, ruling at the several centres named, is published for general information.

CENTRE.	A Wheat per 100 lb.	B. Wheat Flour per 100 lb.	C. Boer Meal per 100 lb.	D. Mealies, per 100 lb.	E. Mealie Meal per 100 lb.	F. Barley per 100 lb.	G. Oats, per 100 lb.	H. Oat-hay, per 100 lb.	K. Tobacco (Boer Roll) per bag	L. Beef per lb.	M. Mutton per lb.	N. Fresh Butter per lb.	O. Eggs per doz.	P. Cattle (Slaugh- ter)	Q. Sheep (Slaugh- ter)
Aliwal North	£ s d 0 10 0	£ s d 0 17 0	£ s d 0 13 6	£ s d 0 9 0	£ s d 0 11 6	£ s d 0 9 0	£ s d 0 14 0	£ s d 0 13 0	£ s d. 1 0 0	£ s d 0 0 11	£ s d 0 0 11	£ s d 0 4 0	£ s d. 0 2 0	£ s d £ 19 to £ 23	£ s d 24/- to 32/-
Beaufort West	0 13 6	0 18 6	0 13 9	0 13 6	...	0 14 0	0 15 0	...	0 16 0	0 0 8	7	0 2 0	0 2 0	20 0 0	1 2 6
Burgersdorp	...	...	...	0 13 0	...	0 10 0	...	...	0 12 0	...	0 10	0 2 6	0 2 0	...	...
Cape Town	0 11 0	0 12 6	0 11 0	0 9 0	0 13 0	0 9 0	0 11 0	0 11 0	1 1 0	0 0 8	0 0 7½	0 1 6	0 2 0	...	...
Clanwilliam	1 0 0	1 12 0	1 2 0	...	...	...	...	...	...	0 0 8	0 0 7	0 1 9	0 1 6	15 0 0	1 0 0
Colenberg	0 10 0	...	...	...	...	...	...	0 6 0	0 17 0	...	...	0	0 1 6	...	...
Craddock	...	...	...	...	...	...	...	0 6 0	1 0 0	0 0 9	0 0 7½	0 6	0 1 9	...	...
Dordrecht	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
East London	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Graaff-Reinet	0 11 9	...	0 13 6	0 12 6	...	0 10 6	...	...	0 15 0	0 0 7	0 0 7	0 2 3	0 1 7½	£ 13 to £ 16	22½ to 34/-
Graham's Town	...	...	...	0 14 6	...	0 10 0	...	0 10 0	0 16 0	0 0 10	0 0 10½	0 2 10	0 1 8½	...	...
Kimberley	0 13 0	0 17 0	0 15 6	0 12 6	0 13 0	0 12 0	0 13 6	0 13 6	1 10 0	0 1 2	0 0 10	0 2 3	0 2 0	£ 15 to £ 20	20/- to 24/-
King Wm's Town	0 12 6	0 16 3	0 13 9	0 12 6	0 11 3	0 12 9	0 14 6	0 11 6	0 18 0	0 0 8	0 0 9	0 2 5	0 1 4	£ 20 to £ 26	27/- to 44½
Malmesbury	0 10 6	0 13 0	0 12 6	0 10 0	...	0 10 0	0 10 0	0 10 0	1 0 0	0 0 8	0 0 8	0 1 9	0 2 0	16 10 0	1 5 0

CURRENT RATES OF AGRICULTURAL PRODUCE—(continued).

CHARTRE.	A. Wheat per 100 lb.	B Wheat Flour per 110 lb.	O. Boer Meal. per 100 lb.	D. Mealies per 100 lb.	E Mealie Meal. per 100 lb.	F. Barley per 100 lb.	G. Oats per 100 lb.	H. Oat-hay per 100 lb.	J Potatoes per bag.	K. Tobacco (Boer Roll) per lb.	L. Beef per lb.	M Mutton per lb.	N Fresh Butter per lb.	O Eggs per doz.	P Cattle (Slaugh- ter)	Q. Sheep (Slaugh- ter)
Mossel Bay	£ s. d. 0 13 0	£ s. d. 0 14 0	£ s. d. 0 13 0	£ s. d. 0 9 0	£ s. d. ...	£ s. d. 0 7 6	£ s. d. 0 15 0	£ s. d. 0 7 6	£ s. d. 1 5 0	£ s. d. 0 1 0	£ s. d. 0 0 9	£ s. d. 0 0 9	£ s. d. 0 1 6	£ s. d. 0 1 6	£ s. d. ...	£ s. d. ...
Flekrantzburg Natal	..	..	..	0 7 0	0 7 9	...	..	0 10 0	0 15 0	0 1 0	0 0 10	0 0 10	0 2 3	0 3 0	02 0 0	1 5 0
Port Alfred	..	..	..	...	...	...	..	...	0 17 0	...	...	...	0 1 6	0 1 3	...	..
Port Elizabeth	..	..	..	0 10 6	...	0 8 6	..	0 13 6	1 4 0	0 0 5	...	...	0 2 3	0 1 6	...	..
Queen's Town	0 11 0	0 15 6	0 11 0	0 13 0	0 5 6	0 12 3	0 7 9	0 7 0	1 5 0	0 2 6	0 0 8	0 0 7	0 3 0	0 1 6	...	..
Tartstad	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Vryburg	0 16 0	1 1 6	0 18 0	0 14 3	0 15 6	...	0 13 6	1 1 0	1 0 0	0 1 7	0 0 10	0 0 10	0 3 0	0 2 6	£18 to £25	..
Worcester	0 11 6	0 15 0	0 12 6	0 11 0	0 12 0	0 11 0	0 11 0	0 6 3	1 3 6	0 0 7	0 0 8	0 0 8	0 1 8	0 1 10	15 0 0	1 16 0

NOTE.—Returns have not been received from the Civil Commissioners of Dordrecht, East London and Tartstad

THE Agricultural Journal.

No. 5.

NOVEMBER 1st, 1902.

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EDITORIAL NOTES.

It is again our pleasant duty to acknowledge appreciative references to the improvements and get-up of the *Agricultural Journal*. As we seem to have caught the desired spirit which should animate a publication of this description our endeavour will be to continue along the present lines and add further improvement where we can.

The Zwaart Ruggens Farmers Association, one of the mouthpieces of the Midland farmers, is not to resume activity until January, when the annual meeting is to be held. There should be a big agenda after so long a silence and many matters of importance to discuss.

The Chalumna farmers recently discussed the quarantining of their farms for quarter evil, and the opinion was expressed that they would prefer the restriction being withdrawn owing to the necessity for a change of pasturage in order to prevent further cases. But how about their neighbours?

A large number of farmers are now seeking apprentices in terms of the Government notice published from time to time in the *Agricultural Journal*. Young men who wish to go in for farming should apply personally or by letter, to the Agricultural Department.

Dr. A. Loir, of the Pasteur Institute, Paris, has, since our last issue, proceeded to Bulawayo to establish a branch of the Institute there for the treatment of Rabies by the Anti-Rabic Inoculation method. Dr. Loir is a nephew of the late M. Pasteur and has been engaged in the establishment of branches of the parent institute at Sydney, N.S.W. and Tunis. Rabies, it is feared, is likely to extend among animals in the northern districts.

Stock farmers will be pleased to learn that the Colonial Veterinary Staff has been strengthened during the last month. Five fully qualified professional veterinarians have arrived from England and another is expected shortly. These include Messrs. W. L. Chase, M.R.C.V.S., J. H. L. Lyons, M.R.C.V.S., J. Harrison, M.R.C.V.S., A. Goodall, M.R.C.V.S., and R. Payne, M.R.C.V.S. Of these Messrs. Lyons, Harrison and Goodall have been despatched up-country on Rinderpest duty, and Mr. Payne has been sent to East London.

Another recent addition to the staff of the Agricultural Department is Dr. E. A. Nobbs, Ph.D., B.Sc., F.H.A.S. Dr. Nobbs was educated at Edinburgh where he won the "Stevens" scholarship and three medals beside minor distinctions. He also took all examinations in Agriculture open to him in England and Scotland and passed them. These included the Royal Agricultural Society of England, in Agriculture; the Highland and Agricultural Society of Scotland, in Agriculture and Forestry; and Science and Art Department, honours in Agriculture. He studied nearly three years in Germany at the Berlin University, the Eberswalde State School of Forestry, and the Giesen University, where he graduated. Dr. Nobbs is a grandson of Rev. Dr. J. C. Brown of Haddington, at one time Colonial Botanist at the Cape of Good Hope.

Mr. T. R. Sim, of the Forest Department, has accepted the post of Conservator of Forests of Natal. The sister colony is to be congratulated upon having secured a valuable and painstaking official. Mr. Sim was well-known on the Border and in the Eastern Province where his work was highly appreciated, Mr. Sim's contributions to this Journal were always valued, while his more ambitious literary work "The Forest Flora of the Cape Colony," which should soon be published, promises to prove of absorbing interest to botanists.

In this issue will be found a number of reports from various districts in the Colony and the Transkei giving particulars of the cultural conditions and prospects. These reports are gathered through official sources and may be relied upon as fairly representing the conditions in the districts mentioned. They are brought up to the middle of October and will be published monthly in order to supply readers with a general knowledge of what is going on in all parts of the Colony.

From these reports in this issue it may be inferred that the coming season can be anticipated with a certain degree of gratification. crops and stock are doing well on the average and locusts seem to have disappeared, except in the Hanover and Albert districts. What this means can only be realised by those who have watched the country devastated season after season by these pests.

The Rinderpest statistics published in another part of this issue show the progress of the disease up to the 23rd ult. Considering the wide area over which the disease spread, and that it had time and opportunity to firmly establish itself owing to the disturbed conditions of the districts affected, the Veterinary Department is to be congratulated upon having succeeded so well with suppressive measures. The deaths among the 24,505 head of cattle affected total to 4,530 or slightly over 20 per cent.

The severe drought in Australia has opened the eyes of South African farmers generally. One up-country paper commenting on the two countries points out that where we evidently have the pull on Australia in drought seasons is that we have good permanent water and they have not. A sententious summing up of the case that fills a generality, but is not altogether true. In some parts of Australia they have better permanent waters than we have, but in others they have not. The superiority of South Africa really lies in the number and superiority of its natural drought-resisting fodder plants.

Elsenburg is to be the scene of an interesting harvesting competition during this month. The date is not yet fixed as it depends upon the season. But so far as present arrangements go the effort

promises to be very successful. The various makes of harvesting machinery are expected to be well represented, and a keen interest is anticipated. The competition is organised by the Western Province Agricultural Society and Dr. E. A. Nobbs, Ph.D., B.Sc., of the Agricultural Department, has been selected to judge. Further particulars may be obtained from the Secretary of the Western Province Agricultural Society.

Among the correspondence in this issue will be found a letter from Mr. W. H. Pigott, of Highlands, dealing with the ever-present question of tick-infection and scab in sheep. His remarks that farmers, as a rule, are practical men, and no theorists, who believe in ocular demonstration, is the statement of a truism which is generally accepted. He might go further and say that farmers are also very conservative as a rule and view with suspicion most innovations. The main difficulty is to arrive at positive results which commend themselves to all and are accepted without reservation. This is particularly the case in connection with such diseases as redwater and heartwater. The Veterinary Department has devoted the closest attention to these diseases and the results of the careful and exhaustive investigations have been made public from time to time, but the adoption of precautionary measures is not, as yet, by any means a general custom. Inoculation for redwater undoubtedly sets up a resistance in some cases but all the experiments show that it must be supported by protection against tick infection to render cattle perfectly immune.

As to the reference to the heartwater experiments carried out in accordance with the method advocated by Dr. Purvis, we can only inform our correspondent that they were inconclusive and added nothing to the knowledge already obtained by the Veterinary Department from previous investigations. It is not wise therefore to dogmatise on such a complicated subject, for though apparently favourable results may be obtained in certain conditions those results may be partly accidental. It is only when a theory is so thoroughly tested under circumstances which eliminate as far as is humanly possible the intrusion of accidental disturbing factors that it can be accepted as of any value. No one could be more anxious to solve these problems than the veterinary staff, as is proven by the extreme care with which all their experiments are conducted, and the supplementary investigations of the Government Entomologist (Mr. Lounsbury). These give stockmen a sound basis to work upon which is certainly worthy of trial on a large scale. To get at the originating cause of a disease is assuredly better than looking for doubtful cures.

Another correspondent, Mr. J. D. Mills, of Post Retief, has also apparently a good deal in his mind about various matters, and it is as

well that he has the courage of his convictions and says what he thinks in plain language. He is also a believer in the practicability of the South African farmer—an excellent and admirable trait in his character. There can be no doubt that our stockmen particularly have shown an excellent spirit in the face of many disheartening circumstances, and overcome difficulties which have appeared almost insuperable. But the Veterinary Department, and particularly Mr. Hutcheon, the veteran Chief, has had a full share in that work. The questions forwarded to Veterinary Surgeons are not always stated with that clearness and precision which are necessary to a full understanding; and it is not surprising that further information is frequently required. Mr. Mills has followed the teachings of the Colonial Veterinary Surgeon as is evidenced by his letter and if others would do likewise they could avoid much of what he complains. A busy Veterinarian is naturally prone to suppose that simple ailments are not referred to him. It may be a mistake for him to think so but he naturally supposes that with all the instructions issued from time to time by his department in the clearest possible form, the ordinary afflictions of stock are fairly well understood. He is prone therefore to anticipate complications of some sort.

The eradication of burr weed, a very hardy annual in a double sense, has been occupying the attention of the Agricultural Department of late, and, it is gratifying to be able to state, with some measure of success. The matter was first taken in hand in connection with the enforcement of eradication in Griqualand East when it was found that in the adjoining territories of the Transkei the law was not sufficiently strong to act upon. After a good deal of correspondence a proclamation was issued on September 30th giving the necessary powers to Headmen in the Native Territories to call out their people to extirpate the noxious weed. Instructions were also given that simultaneous action be taken during October and November for eradication of the weed before it comes into flower. This should meet the complaints of those districts adjoining the Native Territories where wool has been deteriorated and other damage done by the weed. Further steps are now being taken to secure eradication in the Colony and hopes of success are entertained.

Trusts have come to be looked upon as a new form of oppression but "it's an ill wind that blows nobody any good." The Acting British Consul at Chicago (Mr. Thomas Erskine) has submitted a short report to the Imperial Government on the formation of a trust or combine of five large American harvesting machinery makers, which it is anticipated will bring with it a decrease in price in all exported machines. "The capital of the new combine or Trust is fixed at £24,000,000, a conservative estimate of the value of the combined businesses. This amount is to be held as common stock, but if at any time further capital is required this will become preferred stock

at 6 per cent. and the new capital will become the common stock. The five firms employ at present over 1,500 men to supervise the 5,000 travelling salesman and canvassers and it is said that under new conditions the services of three fourths of these can be dispensed with. The plan of having only one man in the largest towns, instead of five, and letting the buyer come to the salesroom where all the different firms will have their machines will also lessen the amount of correspondence and the number of employes in the offices. A great reduction will also be made in advertising.

"It is expected that altogether, notwithstanding the rise in price of raw material this year, machines will be marketable at a reduction of more than £10 per cent. on the present price, as it is stated that it costs more to sell a machine under the present methods than it does to manufacture it and as there will be no competition in the United States to require reduction in prices to obtain sales, the companies could stand a still further reduction in the export trade. The combined companies manufacture mowers, reapers and binders, maize reapers and binders and hay rakes (horse). They do not manufacture any other implements. The inventions have been covered at different times by 11,258 patents and the exports are more than half of all agricultural implements. It is said that a branch factory will be built in Canada to save the duty. There has been little change in the total export of agricultural implements during the last three years but while the ploughs and other implements have increased in numbers, harvesting machinery has fallen off £600,000 in value and great efforts will be made to regain this trade. Of the five firms two have their factories in Chicago, one turning out over 300,000 and the other 250,000 machines; one in another part of Illinois produces 50,000; one in Wisconsin, 40,000; and one in Ohio, 75,000. The five companies produce over 760,000 machines annually and employ 20,000 workmen. It is stated that competition for the trade is very keen and that cuts of £3 have been made by rival agents to make a sale. Under the new conditions it will not matter which machine it sold and no inducements to buy will be offered."

This will be good news to agriculturists all over the world, though not quite so pleasant for the English and continental manufacturers of this class of machinery. It means that harvesting machinery should be obtainable at a considerable reduction in cost in the near future for the other makers are bound to follow the American lead. Whether the Americans succeed in capturing the market or not the users of the machines will benefit.

Among the many districts of the Colony open to extensive development on the agricultural side that of Caledon has ranked for years past among the first for consideration. Its fruitfulness and productivity in times past gave it a high position in the Colony, but

the neglect of years was bound to have its effect. Other districts were opened up by railway communication and production stimulated thereby. But Caledon was left to its own resources. No sooner, however, is the district entered by a railway than the scene begins to change, and on every hand indications are noticeable of a desire to move more in accord with the altered conditions and meet the more favourable circumstances which now prevail.

A short personal trip to the centre of the district during last month has left a most favourable impression as regards its Agricultural possibilities. It is so varied that mixed farming is largely followed, particularly in the Ruggens, where stock and cereals and fruit, thrive evenly well, and where vines and woolled sheep may be cultivated with profit side by side. Of course this cannot be done on every farm, but there are few districts in the Colony which can compare, acre for acre, with Caledon for fertility.

From the Groenelands to the Strandveld and from the Ruggens to River Zonder-End Valley, there are enormous possibilities. The present season is abnormal as in most of the Western districts, and the late rains have thrown the cereal crops back a bit, but beyond this consequent delay to growth very little harm seems to have been done. There is rust, of course; like the poor it is always with us. But it does not look like a damaging attack. The pity is that it is appearing in the Algerian oats from Colonial grown seed, and from seed which the farmers declare is sold to them as freshly imported. If the statements of the sellers are accurate it means that the rust of South Africa has broken down the resistance of the Algerian Variety. But if importers or dealers are playing hanky-panky with the seed, we are left with the conclusion that even the Algerian only retains its resistance to rust for about two generations. In some cases scarcely that.

The suggestions contained in what is to be seen in the oat crops of the Caledon District give rise to another question which must come prominently to the front before many more years pass over us. That is the necessity for an efficient and proper control of all imported seeds. The farmers now seem to have an idea that the Government or the Agricultural Department should set up as wholesale seed importers and supply them with guaranteed seeds of the best qualities for their purposes. That this is scarcely the function of a Government or a Government Department will be apparent on closer examination. But there is no reason whatever, except perhaps on the score of expense which would be slight, why the authorities should not exercise a proper control over the seed that is imported and see by careful expert testing that all seed offered to farmers is what it is represented to be. If that were done complaints such as are common

now, of *rammenas* or wild-mustard, of *drabok* or darnel in cereals, and dodder in lucerne, would soon cease and the farmer be in the position of knowing that all imported seed would have to bear the official stamp.

Caledon may, undoubtedly, be looked to in the future as a great producer, and with increased production improved methods of farming are almost bound to follow. In fact signs are not wanting which indicate not only a desire for better things but the energy and the spirit to bring them about. Take for instance the splendid work carried on by Dr. Viljoen of Oak Valley in the Groenelands and that carried on in the River Zonder-End Valley at the other extreme, and we can see at once that, given encouragement, the development of the whole district would move very rapidly and along the best lines. Irrigation is being practised on a very large scale already, while the use of up-to-date implements is common on every hand. The question of a suitable rotation of crops is not as yet among the practical attainments of the farmers but that will come in good time for the people are anxious for information. The value and uses of artificial fertilizers are eagerly discussed, and in this connection it is proposed by the Department to institute a series of manurial experiments in the district with a view to ascertaining the most suitable fertilizers for the different crops and soils.

Among other agricultural revivals after the war is that of the Mohair Growers' Association, which promises to hold a meeting in December at the same time as the Ram Fair is held at Graaff-Reinet. Writing recently to the Graaff-Reinet paper the Secretary, Mr. E. R. Hobson says:—"I may state that since our Association was started with the object of improving the production and get up of our clips, many changes in the requirements of the trade have taken place. At the time the Association was started it was very desirable to encourage the growing of a longer staple, and our members were urged to keep this object constantly before them, with a view to competing with the American growers. We were told by buyers and manufacturers that the greatest fault of South African mohair was its shortness. Correspondents and others were constantly telling us that the Cape Farmer was ruining the trade for Cape Mohair by sending short stuff to the market. Now we find that length is scarcely a consideration at all—fineness is the great essential. It is very discouraging to find that the trade so often chops and changes."

The position of Mohair growers is certainly perplexing but a little careful thought would show them, we believe, that they are at last on the right track when they are advised to breed fine fleeces in preference to weight and quantity. It is a permanent market of the

least fluctuating description that is the nearest approach to the perfect ideal of any producer. Mohair growers can only attain this by growing fine fleeces and the finer the fleece, provided the quality is sound, the more permanent and assured is the market. Mr. S. B. Hollings, the expert correspondent of the *Midland News*, recently made this very clear in a contribution to that journal. After showing the difference in the values of Cape and Turkey hair he says:—"I am glad to think that a few leading goat breeders in the Midland district have made fineness of quality and lustre their first consideration, and honourable mention could be made of a good half dozen whose flocks to-day are of the standard of Turkey, and with whose mohair clip there is no difficulty of sale, but speaking generally these are the exception and not the rule. These are the non-oily men, breeders who have not gone in for breeding the Geredah class of goat, but have kept strictly to the Angora and Beybazar goat. The former grow a fleece of a very oily nature and of fair quality and character, but the Angora and Beybazar goat stands paramount in the eyes of Bradford mohair merchants, and for the best class of hair in which is combined quality, fineness of fibre and lustre, there are none to equal them. I mention this fact in the earnest hope that other breeders will go in for this class of goat. The Geredah goat no doubt yields a heavier fleece, but it is heavy on account of the presence of more yolk in the fibre, which only means that it has to be scoured out and goes down the drain as waste, while in point of lustre and sparkle it does not compare to the style of hair produced in the province of Angora and Beybazar. It is this class of hair that for the past three seasons has all been bought up and has realised too the highest price in the market."

In showing why fine hair is wanted Mr. Hollings states: "Cape mohair, or at least the bulk of it, is only fit for 28's or 32's yarns, very little sorting up to 40's, and it is in this latter count that the most profitable trade has been done during the past three years. When there is a good braid and plush trade doing then it is that lower qualities of hair can be used, but when there is any dress trade doing, only the finest qualities will spin to the required thickness which manufacturers desire. Here we have in a nutshell the fact explained why merchants want fine mohair, for as I have said in past letters, it is impossible to spin a coarse fibre into a thin yarn, but it is possible to spin a fine fibre into coarse yarns; in other words fine mohair can be spun down to the thickness of common string, but coarse mohair can never be spun up to the thickness of say a silk yarn. Here goat breeders can see at once why it is our manufacturers and spinners are to-day giving the greatest consideration to the best qualities of mohair, and so long as the gentler sex find delight in wearing lustre fabrics, so long will the greatest call be for something of character, lustre, and fine, quality."

The Western Province Agricultural Society is holding a Horticultural Show at Rosebank on the 7th inst. The prize list has been framed on a generous scale, and should be the means of inducing a capital display of flowers and pot plants. Prizes are also offered for fruit and vegetables, and a special attraction is provided in the ladies' competition for the best decorated dinner table etc.

The diatribe of "A.W." in our last issue against simultaneous dipping is meeting with a good deal of support in several quarters. Our correspondence this month speaks for itself, and Mr. Pell Edmonds's letter commends itself as being at least thoughtful. But our correspondents mostly forget that simultaneous dipping is a sore spot with sheep men and they are all apt to wince a bit when they are touched there. The object of all legislation is to get at the wrong-doer. Laws are not made for honest men, and when honest men come into contact with them they invariably suffer. The same may be said of the Scab Act. Weak and insufficient though it is, for the purpose aimed at, the eradication of scab, it is meant to catch the man who will not keep his flocks clean. To do that, the innocent have to put up with many inconveniences in order to assure the redemption of the sinner. Unfortunately the sinner is rather hardened in this case and takes so much redeeming that the innocents are beginning to rebel.

As was admitted last month there is something to be said on the side of the innocents. An esteemed correspondent, himself a sheep farmer for many years, goes so far in a private communication, as to justify the bulk of "A.W.'s" contentions. He describes simultaneous dipping as an absurdity and goes on to say that what is wanted is a stringent Act and vigorous dealing with scabby stock. Then he turns his attentions to "A.W.'s" complaint as to the cost of dipping and points out that even according to our showing it may cost 50s. a thousand to dip sheep. That would amount to £25 for 5,000 dipped twice, and if there was any length of wool on the animals it would be damaged at least a half-penny per pound. Taking each sheep to shear 6 lbs. of wool which would amount to 30,000 lbs. for the clip, the loss there would be 15,000 pence, equal to £62 10s. Therefore, he argues, "A.W." is not exaggerating so very much when he says it means a loss of £15 to £100 each simultaneous dipping. The damage to the wool, however, cannot be accepted as a positive factor. The real question at issue is the cost of dipping.

In Heartwater Districts, our correspondent continues, dipping is most desirable. Sheep are the healthier for it, but the first dipping must be done soon after shearing and the second dipping be completed not later than from four to five weeks after shearing. If lime

and sulphur are used it can be done at from 25s. to 35s. a thousand ; with dear labour it may cost much more. But to force a farmer to dip where neither scab nor tick nor heartwater exist is an absurdity. Without unduly pressing the case made out by "A.W." in favour of a rebate on wire-netting for enclosing sheep lands our correspondent aptly points to the gift of free dip to the owners of scabby sheep as a precedent. The losses by jackals he maintains is a serious handicap to the young farmer struggling to establish himself. Netting is fearfully expensive and if it could be cheapened the country would ultimately benefit. Every lamb saved means more wool, and more wool, more wealth. There is a good deal to think over in this view of the case and it may yet receive more attention.

Attention is directed to the exhaustive report on Redwater in Rhodesia which appears in this issue. Messrs. Gray and Robertson have spared no pains to place on record all the prominent features of the disastrous outbreak which caused so much consternation at the time. From the investigations and enquiries thus recorded some very valuable information may be gleaned, for though Redwater or Texas Fever holds very few terrors to the cattle farmer in those districts where the pathogenic tick abounds there are still many parts of the Colony where an outbreak anything approaching the virulence of the Rhodesia epidemic would be a very serious matter indeed. One fact established by the report is, that the disease was in no sense complicated by Rinderpest in any form as was at one time suggested, and another is that the introduction of susceptible animals to Redwater-infected pastures has a tendency to increase the virulence of the disease, and cause it to spread with a fatal rapidity which is paralysing to all preventive efforts.

This highly interesting report brings us to the inevitable discussion of the question of tick destruction. As the malignant carrier of infection the tick is the general enemy of the South African stock farmer. The devices so far developed for the destruction of these pests have now all been fully described in the *Agricultural Journal*, and it rests with the stockmen to say by actual experience which they may find most effective. In the October issue we dealt largely with the question of spraying and the paddocking of tick infected areas in order to suppress the infection of heartwater and pointed out that the same methods would apply to redwater. In this issue the alternative of dipping for tick destruction is fully explained. The stock-farmers of the country have now before them a choice of preventives and as each is quite practicable it is only a question as to which is the most effective in destroying ticks and the least harmful to the stock treated. The dipping process is now in course of trial in Natal and Rhodesia. Spraying we may classify as a farmer's remedy.

In the case of dipping cattle the installation of the dipping plant is a matter of some expense and it cannot be expected to be resorted to generally by individuals on that account. And until an urgent necessity can be shown, the institution of a series of dipping stations at the public cost, is, it is to be feared, a little problematical. But spraying can be carried out at a much less cost, in fact, at a cost which is well within the means of every cattle farmer of any standing. Sheep and goats may be excluded from consideration, for provided they are kept fairly clean and regularly dipped for scab, ticks should be kept under to a certain extent. But with cattle it is different. Mr. Lounsbury, the Government Entomologist, has demonstrated the part that cattle play in the transmission of heartwater by the bont tick; and the transmission of redwater is well-known. We have, therefore, arrived at that stage where the destruction of ticks becomes as much an affair of national importance as the eradication of scab.

This opens up an immense field of usefulness to the practical stock-farmer. Laboratory experiments are useful so far as they go, but really valuable results can only be obtained in practical application, and practical application on as large a scale as possible. This question of tick destruction has grown out of the laboratory stage and calls for experiments on a wider scale. If it is possible by spraying for Mr. Douglas to improve the condition and value of his herds at Heatherton Towers, and for Mr. Roberts to follow suit at Cottesbrooke, it is possible by united effort for a whole district to be so treated that in a couple of years ticks, and with them many of the diseases transmitted by them, would become much less common than they are at present. The great value of paddocking lands has yet to be fully realised in South Africa. It looks expensive, it looks beyond the power of the community to carry it out on a comprehensive scale, but it will have to be done some day and it may as well be tackled at once.

Some farmers firmly believe it to be impracticable. In fact we have heard the remark made, "If I could afford to fence in that piece of land and keep stock off it for a year or two the natural grasses would soon kill all the weeds." This is the whole case in a nutshell. Even the most progressive of our farmers are handicapped more or less because of the magnitude of the reparatory work they have to undertake to restore the balance which has been disturbed by thoughtless or uninformed predecessors. The natural grasses of the country are grazed to the roots in times of drought but the weeds thrive apace; the succulent fodder plants of the Karoo are almost rooted out and destroyed in times of scarcity while the noxious *basjes* are left to spread themselves over the face of the land. No one takes timely precautions, the land is overstocked and gets no rest and the inevitable result is exhaustion of the pastures. Then

comes disease and with it the cry for remedies for what might so easily have been prevented.

Paddocking, though expensive, by giving the land much needed rest, is the one cure for most of the evils that afflict South African agriculture. And if accompanied by spraying as suggested by Mr. Lounsbury in our October issue, there can be little doubt but that great benefits would result. The paddock would not only starve out the ticks but give the natural vegetation a chance. Can any stock-farmer imagine the condition of the coast divisions of the Eastern Province fairly clear of ticks. They would be the richest stock pastures in the world. Again let the imagination conceive the *spekboom* protected and cultivated as it should be in most of the hilly Karoo districts and the *Pentzia* cared for and preserved instead of being grazed out of existence and say what country in the world could rival us for natural fodder plants. These are the lines along which agricultural development will yet have to proceed if success is to be attained and to reach this position paddocking on a large scale is bound to play a very important part.

The bulk of the readers of the *Agricultural Journal* will be interested to learn that as a result of a personal visit and investigations carried out on the spot at the request of the Rhodesian Government, Mr. Hutcheon, C.V.S., entirely concurs in the conclusions arrived at by Messrs. Gray and Robertson in the report published in this issue. So much controversy has arisen as to the exact nature of this outbreak that the decision of so experienced an authority should carry conviction to the most sceptical minded. It is an unfortunate fact that in veterinary matters the sceptics predominate, for every second man one meets has his own ideas on the most intricate problems that puzzle the scientific world to solve; as a result, usually, a good deal of confusion prevails where clearness and accuracy would, at times, be of incalculable value.

The most important lesson to be learned by the Colonial farmer from the outbreak of Redwater in Rhodesia, is the extreme danger of introducing susceptible stock to areas where pathogenic ticks abound without taking every possible precaution. The fact is now firmly established that redwater increases in virulence according to the field in which it develops. Freshly-imported stock have proved over and over again a source of great danger in redwater districts. Not only do they succumb with rapidity to the disease themselves but the infection carried from them is so virulent as to break down all resistance—even that of an immunity established for years like that of the coast cattle of Natal. There is no need for our stockmen to feel alarmed at this development, but as it is now a fact established beyond question, the exercise of precautions where

imported cattle are brought into suspected areas is all the more requisite. The re-stocking going on up north and the general desire to improve the cattle of the country by imported blood contains all the germs of trouble unless preventive measures are closely studied and exercised with vigour. Hence our strong advocacy of tick suppression.

A Frontier correspondent hastens to correct a misapprehension in the October issue of the *Agricultural Journal*. He states that what the sheep farmers of the Eastern Border desire is not instruction in the grading and packing of wool, as we supposed, but a professional sheep-grader. He seems to believe that the produce-buyers of East London and Port Elizabeth cannot assist the farmer very much in this direction, which is quite apparent. The farmers want the services of a sheep-grader he says to grade the sheep into three classes each year before shearing so that, "as in Australia, they will in time breed an even quality of sheep and wool." They do not want to have anything to do with the local produce-buyers as they (the buyers) do not know the full value of wool and the ultimate intention is to deal direct with the large wool markets of the world. The idea is to secure the co-operation of several Farmers' Associations in adjoining districts in order to give the professional grader enough sheep to keep him busy.

No one could quarrel with such laudable ideals except that they seem a little out of perspective. It is a poor compliment to the flockmasters themselves to tell them they do not know how to cull their own flocks. And as to grading into three classes each year for shearing purposes, it is to be feared that something more will be needed before the Australian level is reached. With all due deference to our correspondent, the grading of the wool is really what is needed. Careful classification of the wool would soon teach a farmer which were the best sheep and he would do the culling himself. As to the produce buyers and their knowledge of values we still believe that by co-operation with the farmers a good deal would be gained. So lately as August the 20th a leading wool buyer in Cape Town, Mr. G. A. Meyer (representative of Messrs. Crooks & Co.), wrote to the *Cape Times* on the same subject a most interesting letter urging the very points our Frontier friends are debating.

He went to some pains to point out the disadvantage under which South African wool labours. There are, he stated, many points to be considered by the wool buyer when he makes his purchases, but equally with quality and yield, ranks the manner in which the clip has been sorted. It may be well known that Australasia is famed for its quality of merino wool, but it may be news to many of our farmers to what extent the Australian squatter grades his wool, and

in this chiefly is to be found the reason why his wools fetch so much higher prices than South African wools. It has been the practice for years by many South African farmers when shearing to get as much into the bales as possible, and frequently matters entirely foreign to wool go along with it. This requires to be altered if South Africa is ever to become a country whose wool is expected to find a prominent position in the Home markets. The Australian squatter has his wool sorted by an experienced wool sorter, and while the fleeces are passed on to him the different classes are carefully separated and baled. We, of course, do not for one moment mean to compare the quantity of wool grown in this country with that of Australia, and while it pays the Australian squatter to engage the services of a professional wool sorter, the expense entailed might be too much to each individual farmer in this country. We are, however, of opinion that the Farmers' Associations in the country would do well in engaging and maintaining the services of several expert wool sorters, to go through the country at shearing time, and by these means gradually raise the standard of the wool exported from South Africa.

Continuing Mr. Meyer pointed out that much could be done by the farmers themselves, by sorting more carefully, and said: "As it is now South Africa has too long had a bad reputation in the Home markets, which applies to wool as well as to mohair, and it is high time different methods were adopted. It is an easy matter to reason out why it will pay the farmer to class his wool thoroughly. Very frequently we find in our purchases here even in so-called sorted clips, three or four classes of quality, length and yield all mixed together in the bales; now, if this wool is purchased by a manufacturer, who can use probably only one class, he is obliged to take along all the rest of the wool for which he may have no particular use. It follows that his competition will not be particularly keen, or he will pass the lot altogether. The case, however, is entirely different if the wool offered for sale has been properly classed. A manufacturer finds several smaller parcels which will exactly fill his requirements, and not being obliged to take unsuitable wools along with them, he will generally be found quite willing to pay for them, while the classes not suitable to the requirements of one buyer will soon find purchasers to whom they are suitable, so that the clip stands a far better chance of being disposed of at remunerative prices instead of being a drug in the market."

So much for that side of the question. We may now turn to another aspect. We suppose it will be generally admitted that half measures of this description cannot prove an unmixed blessing. It is easy to cite the Australian example, and the apparent results of scrupulous care exercised on the larger stations there are so satis-

factory that the first word on everybody's lips is "go thou and do likewise." But in the interests of sheep-farming generally in South Africa we are compelled to call a halt for at least a moment or two to consider the conditions of the industry in the two countries. Sheep-grading and wool-classing have been carried to the niceties of an exact science in many parts of Australia, while in South Africa the opposite extreme, we regret to say, is the more common rule. But the mere fact of these antithetical conditions existing is no proof that either is the more correct method. The precision of the Australian method is the direct outcome of the development of the industry, the laxity of the South African is caused by its stagnation.

But given the same set of circumstances and South Africa would probably have followed the example of Australian sheepmen, years ago. It has to be remembered that this ultra-precision of classification is largely confined to the huge stations where flocks up to 200,000 used to graze. In their case it was brought home to them as an absolute necessity that to command the market the wool had to be sorted and packed so as to catch the buyer's eye. This led to the employment of skilled wool sorters at salaries that would take the breath away from a South African sheep farmer. But it paid, because of the enormous extent of the industry and the magnitude of the financial interests involved. This in turn led to the development of the sheep-grader, a profession that followed the teachings of the expert wool-sorter and graded the flocks to meet the commercial requirements as they arose. Each class of wool was kept separate and each flock kept as near to standard as possible. Of course the question of carcase etc., was the grader's special preserve but wool was his principal guide.

It would, therefore, be as well if our friends on the Frontier carefully considered the whole question before committing themselves to any line of action. If they want to improve their wool we would suggest the employment of an experienced wool-classer—another profession separate from both wool-sorter and sheep-grader—who would help them very considerably. He would show them their deficiencies and their experience as farmers should do the rest. What they have to keep before them very prominently is the fact that the sheep-industry of South Africa is on a very different footing to that of Australia and that what might prove suitable there where millions of sheep of even quality are handled—or used to be before the drought—would not necessarily answer here with our thousands, the majority of which are far from uniform. That much can be done by careful observation is proved by what has been done in the past. There are small flocks of sheep in this Colony—that is, speaking comparatively—that compare with any Australians, but they are the exception. In this connection attention is directed to the article on the Australian methods which appears on another page.

Probably the greatest enemy of South African Wool is not the scab, not the careless breeder, or the dirty packer on the farm, so much as some of the up-country storekeepers. The small farmers sell their clips to the nearest village store, get their cash or credit and are content. The storekeeper bundles the whole mixed consignments to the coast where they are either bought as job lots or shipped to the London sales. Now for the one "farmers' clip," properly skirted and fairly evenly graded, that leaves South Africa there must be at least twenty such consignments every season as that we have described. Then there are six months' wools and nine months' wools and the glorious indifference of everybody concerned, from the grower to the shipper, so arranges matters that a careful search would occasionally reveal them all in one bale with a sprinkling of twelve months' growth to boot. Then there is the pernicious habit of baling odd lots bought by the bag irrespective of class, quality or length, and the result is the commercial chaos which leaves South African wools at the bottom of the list. It is difficult for buyers to deal fairly with such an industry. But careful grading by districts and Associations would do a great deal towards improving matters for even now established clips command top prices both in London and Bradford. It is all a question of reputation.

A bright, lively eye, and a clean cut, intelligent head—or as an old cattleman would put it—a sweet face, is usually counted a point of great importance in a dairy cow. Animals possessing a cast of countenance of this type will (says the *Australasian*) usually be found capable of giving a good account of themselves at the pail. Even in fat stock, which are not supposed to be of so nervous a temperament as milch cows, a bright kindly eye is a good sign, more especially when accompanied by that fineness of the neck, and angularity of outline which may always be taken as unfailing indices to good milking capacity. Without a capacious udder and a good middlepiece—which implies plenty of room for the digestive organs to carry on their functions—the feminine head and the kindly eye count for but little, but when present along with the other essential points they may always be taken as indicative of delicate temperament, which usually accompanies distinction at the pail.

Referring to the experiments of Drs. Babcock and Russell, of Wisconsin, in the curing of cheese in cold storage, it is stated that though the expense of the system is somewhat greater than under the old method, the higher returns will more than compensate. The editor of "*Hoard's Dairyman*" has tested some Cheddar cheese, ten months old, cured in cold storage at Wisconsin College, and he reports that "in texture and condition, showing an even and well-balancing curing, it is unsurpassed by any cheese we ever saw. The flavour is clean and wonderfully mild."

The ancient Irish (says the writer of "Scraps" in the "Live Stock Journal") appear to have divided their horses into several classes, as the names used for various animals suggest. Thus they had one word for a racehorse, another for a packhorse, and a third for a saddle-horse, while there was a fourth word to distinguish an English or Welsh importation. They also undoubtedly possessed several different breeds of cattle. In 1830, when the dried-up bed of the "Horse Lake" of Lagore, in county Meath, was dug, an enormous quantity of human and animal bones were found.

It has not been generally thought that centrifugal separation had any particular bearing on the bacterial content of milk. Recently, however, Prof. C.H. Eckels, of the Iowa Agricultural College, has demonstrated that separation does really remove a very large percentage of such bacteria. The germ contents of eight lots of milk were determined, and the lots then run through the separator. The result was that of all the germs in the milk at first, 47 per cent. appeared in the separator slime. The skim milk contained 29 per cent. only of the germs in the original whole milk. That left only 24 per cent. in the cream. It will thus be seen that the cream is much richer in bacterial life than is the whole milk or even the skim-milk. Though the skim-milk contained 29 per cent. of the bacteria in the whole milk, it must be remembered that the cream is much less in bulk than the skim-milk. Relatively the cream by centrifugal separation has about 20 times as many bacteria as the same bulk of skim-milk has.

A Nebraska farmer, in discussing the value of alfalfa or lucerne before the Dairyman's association, said that it is the greatest aid to dairying he has ever found in any crop grown, whether green for grazing or dry for hay, as it produces the greatest flow of rich milk. He says that Buffalo county, Nebraska has 59,680 acres in alfalfa, and it will be increased from year to year. "A good cow," he continues, "can be well pastured on a single acre of alfalfa during the summer months, and reserving the product for another acre we cut from three to five tons of the very finest hay, which will keep a cow through the winter in the very best condition."

The ideal system of agriculture is that where the fertility of the soil is annually increased, and where fair average crops can be grown without the purchase of commercial fertilisers. Soil that is made rich and deep by being subsoiled and plentifully supplied with decaying vegetable matter will give a far more profitable return than where a relatively large quantity of commercial fertiliser is used on land lacking a liberal supply of humus.

FARM AND VELD.

SEASONABLE NOTES.

As the shearing season will have now commenced in many parts of the Colony, the following hints may prove of use to sheep farmers.

Never allow the shearers to drag the animal they are handling by the hind leg, the sheep should be either carried or led to the place reserved for shearing.

The sheep should be clipped on a raised platform, covered with spars or narrow planks, with spans of one inch between each plank. This allows of dirt and dust falling to the ground.

Do not allow the fleece to be broken by the shearer, and deal severely with any man who cuts the wool twice.

Tables of wire netting should be provided, and on these the fleeces should be spread out and carefully skirted. All locks and tags should be thrown into one bale, bellies into another, and any inferior or badly grown wool kept separate from the best parts of the fleece.

Press the fleeces into the bales instead of tramping the wool, and keep each fleece intact.

Be certain that no filth or refuse is allowed to enter the bale. Too much care cannot be exercised in this respect, and is amply repaid in the long run.

The above advice can be adopted by every farmer in the country, whether he be the owner of hundreds or thousands of sheep. The necessary equipment for the shearing sheds can be made on the farm and involve but little labour or expense.

During the shearing every animal should be carefully handled, any cuts or wounds should be treated with a mixture of fat and Stockholm tar. Animals infected with scab especially those which have hard crusted scab should be thoroughly handdressed.

If the sheep have to be branded, avoid the use of tar as it damages the wool and is generally condemned by wool buyers. When handling the sheep every animal should be mouthed and any that are old or inferior should be marked off for slaughter. The aim of every sheep farmer ought to be to attain uniformity to his flocks and breed them up to the highest standard.

Last month we reported that rust had been noticed in a crop of Algerian Oats near Malmesbury. This bad news is further confirmed by observations in the Caledon, Swellendam and Robertson districts. Rust, unfortunately, has been found repeatedly not only in crops from Colonial grown Algerian seed, but also in crops from seed which is vouched as newly imported. At least the farmers bought it as such. In one case a crop from colonial grown Texas seed oats was also found to be infected. While these facts are to be carefully remembered it is comforting to note that as yet the attack is nowhere serious. In fact the oats seem to have gained the upper hand at Klipfontein (Malmesbury division) where the disease was first noted.

Mr. W. Bergh, of Klipfontein, writing on the subject to Dr. E. A. Nobbs of the Agricultural Department (who has this matter in hand) says: The rust has considerably diminished since the warm weather made its appearance and although it has done a certain amount of damage it will be nothing compared to what we experienced a few years ago. I do not think it necessary to forward any more samples. If, however, you want any more let me know. I may add that it has destroyed the Cape Oats everywhere.

Mr. G. C. Olivier, M.L.A., is among the recent importers of blood-stock for the Colony. During a tour in Europe he visited some of the breeding farms in Holland and purchased six of the best Friesland heifers he could obtain and a young bull of high pedigree. The whole were landed at Mossel Bay and forwarded to Oudtshoorn, where they will remain for breeding purposes.

Mr. G. Le Roux, has also secured two good Friesland cows which have been forwarded to Oudtshoorn. That district is evidently impressed with the advantages of a good milking strain, and should soon be heard of in the growing dairying industry of the Colony.

Messrs. Hall of Capetown have landed several blood horses, some of them being the produce of the following famous stallions: Amphion, Ladas, Ravensbury, and Sir Hugo. South America is well represented by a number of two-year olds by such great stallions as Combatie, Avril, J'Y Pense, Halcon, and Alhamar. They are a fine and promising lot of two-year olds. In addition to the racing stock six magnificent Clydesdale stallions have been received by the same firm, three of which have been specially imported to this country from Australia.

Among the reports from the districts published in this issue will be found mention of "Gall-Sickness." As this term includes, among stock farmers of this Colony almost every derangement

of the liver and digestive organs met with in cattle, sheep and goats—it is far from a simple matter to offer advice on the subject. As the various derangements, however, are more frequent in the spring than at other seasons a short reference to that excellent work “Diseases of Stock and their Treatment” by Mr. Hutcheon, C.V.S., cannot fail to be useful. This little work should be in the hands of every stock-farmer in the country, but as it is not, unfortunately, we give the gist of Mr. Hutcheon’s recommendations herewith. After showing that gall-sickness includes any and every possible derangement of the liver and digestive organs, and frequently is really the effect of the animal having eaten some vegetable irritant, the writer gives several cases that have come under his personal knowledge, and the treatment adopted.

In gall-sickness arising from irritation of the stomach and bowels, he says, much depends upon the symptoms manifested. In simple cases a dose of Epsom salts may suffice by clearing away the irritant. But where the irritant is stronger and violent purging is present, opening medicine should be given very carefully, and should be combined with something to allay the pain and inflammation in the bowels. In such cases, their action being astringent, decoctions of various so-called *gall-bushes* are considered effective, as they modify the purging and exercise a healthy action on the inflamed lining of the stomach and bowels. In tulip poisoning for instance, a strong vegetable astringent like a decoction of mimosa bark, administered early in the attack before the liver has become affected, exercises an astringent healing action on the lining membrane of the stomach and bowels, reducing the inflammation which the tulip has set up and modifying the purging which generally follows. Doses of strong tea and coffee which are successfully used in some districts in the treatment of gall-sickness act in much the same manner, as the tea and coffee are usually boiled and contain abundance of tannin.

In cases such as “Black Gall Sickness” where at the commencement there is diarrhoea with dark coloured faeces mixed with mucus, rapidly succeeded by constipation, the dung being of a dark brown colour often mixed with blood, Mr. Hutcheon recommends the following as a very good combination:—

Calomel—from	...	...	30 to 60 grains
Powdered Opium	...	...	40 grains
Or Laudanum	...	...	1 fluid oz.

The opium allays the irritation of the bowels while the calomel relieves the enlarged liver. This may be followed by a mixture of raw linseed oil and lime water—from a pint to a quart bottleful of each. A good rule is never to give large doses of harsh purgatives

when there is evident irritation of the bowels no matter what the cause may be. The treatment for congestion of the liver, a disease more common to stall-fed cattle than those running on the veld is also dealt with at length under the same heading in the same useful little work.

Ordinary strangles, a disease notified in one of our country reports in this issue, though an infectious disease, is not a serious matter to contend with. Mr. Hutcheon, C.V.S. in his work "Diseases of the Horse and their Treatment," gives full instructions. He says: Place the horse in a clean airy shed by himself, if possible, hasten the abscess to ripen by applying a poultice or a mixture of tar and fat which is very softening. If there is much discharge from the nostrils, and considerable difficulty in breathing or swallowing, steam the head, putting carbolic acid, or blue-gum leaves in the boiling water, or better still oil of turpentine. Give warm bran mash, soft green food and take the chill off the drinking water as cold water pains the tender throat. As medicine put a teaspoonful of saltpetre in his mash, or drinking water, three times a day. Do not attempt to pour medicine down a horse's throat when suffering from strangles or sore throat.

Allow the abscess to ripen, and burst itself, unless in cases where the matter is deep-seated, and the abscess is pressing so severely on the opening of the larynx as to seriously interfere with the breathing. In such cases it may be necessary to cut down and allow the matter to escape, but after such interference the abscess is apt to form again. It is better, therefore, to have patience. After the abscess is opened, all that is necessary to do is to clean out the matter well daily, and dress the part with a solution of carbolic acid or carbolic oil.

If the horses affected are grazing on the veld and the weather is mild, it may be unnecessary to do anything, except in cases unusually severe; these should be taken up and attended to, by giving a little gruel or soft food, lest the patients die of starvation from being unable to bend the head to feed. A good dressing of Stockholm tar to the wound, after the abscess has burst, is about the best thing to apply to horses that are not taken up at short intervals to be attended to. In the district report where strangles is mentioned it is bracketed with influenza. It is possible that the supposed influenza may be the initial stage of the disease for it commences like a common cold. The swelling in the throat comes later.

The flowering seasons of fruit trees with the exception of pears and apples being over, it appears that we may look forward to a good

crop in the Western Districts. Though the rain in the latter part of September and early part of October interfered with the flowering of some trees and did in individual cases appreciable damage, the outlook is on the whole very encouraging.

In the Wellington district the late apricots suffered considerably and, as far as advices go, the crop will be poor but the early apricots including Royals will be particularly good. Of Japanese plums the old varieties Burbank, Kelsey and Shiri Smimo are again well to the fore showing an immense crop but it appears that they may in the near future be yet beaten by the Dickson plum for sturdiness of growth and prolific bearing and quality of fruit as the trees planted on various farms give the greatest satisfaction.

Prune culture is also looking up and favourable reports have been received in regard to the behaviour of existing plantations. In the Stellenbosch and adjoining districts including Wellington a much heavier crop than in any previous year is assured. On some farms experiments are going on to prevent the early dropping of the leaves and subsequent premature flowering observed last year, by spraying with Bordeaux mixture.

Peaches have on the whole also set well but on several farms trees are dying or dead, which is presumably due to the presence of a hard pan in the subsoil. The matter will be subjected to a close investigation and reported on in the next issue.

Vineyards have, since the publication of the last issue, considerably advanced, and promise a vintage, if the flowering season is favoured by good weather, which should not be below last year, and may in fact be greater. The first flowering vines have been observed about the last week in October, and in case the weather continues to be favourable flowering should be completed early in November.

Farmers are advised to pay special attention to sulphuring this year as the presence of so much moisture in the ground will favour the development of *Oidium* as soon as the weather becomes warmer. Sulphuring can not be done too early, and vines should receive their second treatment as soon as the grapes have set. Where sulphuring has so far been neglected, it should immediately be practised before vines burst into flower, for sulphur to be efficacious, it must be used as a preventive.

Disbudding, an operation to which attention has been drawn on a former occasion but hardly ever practised in Colonial vineyards, may be applied as early as possible after blossoming and is especially

recommended for young vines to assist the formation of the future tree. It consists in the removing of all shoots not required for pruning next season, particularly the shoots formed near the base of the vine and in the case of older vines, any fruitless shoots not wanted to maintain the proper shape. If properly practised, it will save a lot of unnecessary pruning during next winter.

Farmers who still have wine in their stores should now rack it before the temperature of the cellar, and with it that of the wine, increases. If wines are left alone there is every probability of the sediment formed during the last few months, being disturbed and causing turbidness which before could not be noticed.

The Pear Slug has been a little late in getting to work this season. However, young slugs were observed last week near Cape Town and in Stellenbosch village so it is time to oil the spray pumps and buy the poisons.

The Codlin Moth has begun to appear on the wing in warm and sheltered situations. Where it occurs the apples and pears should be given a spraying with Paris green, or other insoluble arsenical poison as soon as the petals fall. When the blooming is irregular the first spraying has often to be done before all the blossoms are off.

The number of sprayings needed for the control of the codling moth has not been determined at the Cape. Probably three or more are advisable, the first now, the second after two weeks and the third three weeks later. A test of one to six sprayings has been planned in a small Stellenbosch orchard this season.

The black spotted red beetle now feeding on the surface of the leaves of various grains and grasses is a black sheep amongst ladybirds. The black spiny grub accompanying it is its larva.

There are other undesirable ladybirds at the Cape but fortunately not many. The most notorious is a large, round, red and black one which with its prickly grub appears at this time of year amongst pumpkins, melons and other cucurbs, particularly on the Karoo.

The yellow eggs of this unregenerate ladybird are to be found in small clusters on the underside of the leaves of the food plant. Attention to the first appearing insects and their eggs will save time and worry later. It is a stitch by hand that will save many a few weeks hence.

Arsenical poisons, that is Paris green, Climax powder and the like, may be used for destroying leaf-eating lady birds and their larvæ. It is not easy, however, to thoroughly spray the underside of melon leaves. Before any large number of plants are sprayed a few should be done to make sure that the leaves will not be injured. The leaves of some cucurbs are rather sensitive to arsenical poisons. Two *level* teaspoonfuls of Paris green in a paraffin tin of water should be tried and less used if injury is found to result; one *heaped* spoonful will probably make the mixture too strong.

In the Western Province, scale insects appear to have suffered heavily during the past winter. All the White Peach Scale on some trees appears to be dead and the effects of the protracted rains, seem to have been nearly as disastrous to the Red Scale of orange trees.

Jointed cactus is becoming a pest and a menace in some portions of the Eastern Province, and it would be as well if steps for its eradication were insisted upon before it spreads beyond control. At Hankey, Herzog, and other places it has become a nuisance. This plant should be destroyed with promptitude wherever found as it spreads very fast, is carried about by goats and soon threatens to over-run the veld. The best method of destruction is scrub exterminator as employed to eradicate prickly pear. The Agricultural Department supplies the exterminator on application on the same terms as for prickly pear destruction.

Copious rains are not always an unmixed blessing and though they do an immensity of good they also bring undesirable elements in their train. Complaints are rife, particularly among suburban gardeners and the small cultivators of the Peninsula of the ravages of snails and slugs. It is the wet weather that has brought these creatures out as they are only active after heavy rains.

The remedy, or rather preventive, is salt and lime for large surfaces that may be affected by slugs; and in gardens soot may be used, or any of several traps laid for the creatures. Dressings of salt and lime are the most successful destructors, two or even three dressings being necessary, the second to be given ten to fifteen minutes after the first. Salt applied at the rate of four or five bushels per acre and lime at the rate of ten to twelve bushels will clear any field of these noxious creatures, if done over twice in succession, salt especially having an injurious effect on the mucous membrane. This dressing to be effective should be applied after heavy rains, in the evening or early morning for with the sun the slugs disappear. Slacked lime has no effect on them.

Snails are more difficult to destroy, owing to their retracting their bodies into the shell and closing the aperture; and as they can live for several years without food, they offer many difficulties in the methods of destruction. Soot seems to have the best effect as it drives them from the land. Nitrate of soda is also effective as well as stimulating plant growth. In gardens pieces of turnip or cabbage leaves spread on the ground and collected at night will be found to have attracted large numbers. These can be easily gathered and destroyed in a bucket of lime. Wood ash is used by some gardeners. Dusted on infested plants when damp it has been found beneficial.

Much good, in gardens, may be done by destroying rubbish heaps and removing stones which protect snails from the heat and dryness of the air. Many ova are deposited in heaps of leaf-mould. If these heaps are dressed with quick-lime all the ova will be destroyed, as well as many other vermin certain to be present. Rockeries and ferneries in and near gardens are often centres from which numberless snails proceed. All rough herbage should be cleared off these in the winter, and in the spring a good dressing of soot put over them to kill the vermin that have hibernated there. Brewers' grains will attract snails, so they may be caught that way, quick-lime and sulphur mixed in water quickly ending their activity.

At Stellenbosch, the Agricultural Society and Vine and Fruit Growers' Association, we are glad to learn, have commenced active operations again. It is pleasing to see that they have decided to hold a General Show during next January, and a Fresh and Dried Fruit Show during March. As the latter is to be open to the whole Colony, fruitgrowers should bear this in mind and endeavour to send exhibits, and help to make the undertaking which was so successfully initiated in 1899, by the Stellenbosch Association, a complete success.

Return of Fruit Exported DURING MONTH OF SEPTEMBER 1902.

Name of Port.	Description of Fruit.	No. of Packages.	Quantity	Declared Value.
Cape Town	Oranges	1	150	£1 0 0

WOOL-CLASSING IN AUSTRALIA..

What it Means and How its Done.

Wool-classing is the classing of the fleece, as a whole ; as distinct from wool-sorting, which treats of the fleece, in parts, of six or more. Wool-classing is carried on in Australia on all the best Sheep Stations, the owners being fully alive to the extra profits accruing from a small outlay in having the wool classed or graded after the sheep are shorn. The buyers are then sure of obtaining a uniform wool, and the particular sort they require, and are not forced to buy a lot of mixed wool which they do not want, consequently tending to lower the price as a whole. In classed wool they know to a nicety how much it will pay them to bid, at the sales, and will even give a little more to receive the particular brand they favour. The classing of the wool can always be done much better before it is pressed in bales, and saves an enormous amount of work at the sorting houses in England.

Where from 100,000 to 200,000 Sheep are shorn, the clean wool, free from seed, burr, and all foreign matter, is separated from the dirty or seedy wool, which as a rule is not branded the same as clean wool or the buyer grows suspicious of the whole clip, and may be inclined to lower the price on the bulk.

THE PRACTICAL METHOD OF CLASSING.

on most of the large Stations is as follows : a mob of ewes and lambs are brought to the shed the lambs being drafted from the ewes and shorn first. When the wool is off the lamb, it is picked up and put on tables about 5 ft wide and 9 ft long with rollers about 1 inch in diameter, and placed one inch apart to allow the ribs, second cuts, and dirt to fall through. Men are stationed at these tables instructed by the wool-classer to sort the lambs' wool into

First Lambs, which should be long, bright, clean and free from grass seed or burr ;

Second Lambs, short, blacker looking and seedy or dirty,

The Locks that fall through the table are also baled separately ;

The Stained that is coloured by urine is also picked out ;

The dags or wool coated with dung or grease are also separated.

These last two are generally sent to the nearest scour and washed.

The lambs' wool should never be allowed to be mixed with that of grown sheep.

The different wools are placed in separate bins and baled and branded separately.

The shearing and classing of

EWES, WETHERS HOGGETS AND RAMS

are then proceeded with, each sex being finished before another is started.

When Ewes are shorn, the bellies are placed in a bale at once and the fleece remains which is thrown out on the tables, with skin side on the table, and the men called skirters and rollers, generally one on each side of the table, proceed from the neck to the breech to take off all dirty or seedy parts, which are thrown in baskets for the piece pickers to deal with. The fleece should now be free from any foreign matter and clear of grass seed, dags, second cuts, or fribbs. The sides are then turned over about 6 inches and the neck and breech also, giving it another turn and rolling from breech to the shoulder.

On no account should it be tied either with string or a knot in the wool, as the knot tears the fleece and the string is very hard to get out when it is worked at the manufactory. The rolled fleece is then placed on the wool-classers' table, who determine the number of sorts according to the size of the clip. It is not advisable to have too many qualities if the number of sheep shorn be small, on the other hand when the clip will be a large one, from 40,000 to 200,000 sheep, the different qualities are generally as follows.

First Combing or *A*.—long, strong, bright and coarse wool.

Second Combing or *B*.—long, strong, bright and fine wool.

First Clothing or *C*.—Short, strong bright and coarse wool.

Second Clothing or *D*.—Short, bright fine or weak wool.

Dingy or discoloured wool, as dead yolk, earthy or dull looking.

Black Wool, or coloured, or patches taken out of white fleece.

A number of bins are placed near the wool-classer and the foregoing sorts placed in their respective bins. When the pressing commences each bin is emptied separately and the bale sewn neatly up, and branded with the class of wool and weight in each bale, also number etc. The name of the owner should never be changed when once he has earned a reputation for good wool, as the buyers will, and do, trust a certain well known brand and pay higher prices accordingly. The pieces from the fleece, if very heavily skirted owing to grass seed or burr, are treated the same as the fleece in a small way, all the ragged edges and short wool is taken off.

This leaves fairly big, bold, free, wool, with grass seed or burr which is called First Pieces. Second Pieces are the shorter, smaller and dirtier ends of the fleece, but not stained with urine.

Stained pieces are put all together, as are the Locks and dags. In the pieces we then have, 1st pieces, 2nd pieces, Locks, stained, and Dags.

Too much care and watchfulness cannot be shown, on the part of the Woolcleaners as the beneficial result depends on the thoroughness of the work.

SHEEP CLASSING.

That is classing the wool on the sheep's back is not practical to any great extent on the Stations, except, when it is desired to pick out the best breeding ewes, either fine or coarse wool for mating them with rams according to the breeder's fancy. This is best done when the sheep are ready to be shorn and it is also the best time for culling out inferior sheep as either good, or bad wool-producing sheep are easily detected. There are some breeders who cull so heavily that their flocks require very little classing when shorn, but this is only attained after years of careful selection and rejection. Even, then, different sorts are made after the shearing.

On small farms three classes of wool as a rule suffice,

First—long, bright, sound and clean.

2nd—short, bright sound and clean.

3rd—dingy dirty and weak.

The pieces, locks, stained and dags, are treated the same as on a large estate.

MILKING BY MACHINERY.

A Successful Invention.

The Lawrence Kennedy Milker.

Some months ago Sir C. B. Elliott, drew the attention of the Department to a successful milking machine which he had seen in operation in Glasgow. This was the Lawrence Kennedy Universal Cow Milker, which is coming into vogue rapidly in other parts of the world. A writer in the *Australian Agriculturist* recently described the great success of the machine. He said: "It took inventors a long time to bring the reaper and binder to a success. After they had succeeded in surmounting the last serious obstacle, and were able to supply the machines that could do the work of a dozen men it took a considerable time to satisfy the farmers that their crops could be harvested cheaper by machinery than by hand. The milking machines have been passing through a similar experience. Inventors, I think, have had a more difficult task in perfecting the milking machine than in turning out a suitable binder. Judging by the experience with the Lawrence Kennedy milking machine in this State during the past nine months, perfection in milking by machinery has been attained. The next hardest task that still remains, is to convince the Australians that the machine milking is

as much superior in every way to hand milking, as machine harvesting is to the old style of gathering the crops. In one sense, it has been rather a good thing that suitable dairy labour has been so scarce for the past two or more years. This, I dare say, has been the means of causing keener attention to have been directed to machine milking. In August, of last year, Mr. David Mitchell at Cave Hill, Luldale, installed four or five of the machines. The machines gave every satisfaction, doing their work quickly, stripping the cows equally dry as best hired milkmen, requiring no special skill in manipulation, winning the approval of the cows, and lastly, delivering the milk into the cans, free from dirt. Farmers as a rule are very cautious, and they have certainly exercised the fullest caution in regard to the milking machines. Although many false reports have been raised, such as the animals being affected in retaining their milk, and many others, the experience of several other dairymen besides the above mentioned gentleman, having satisfied the most cautious that no fears need be apprehended as to the machines injuriously affecting the milking capabilities of the cows, there is now a very keen demand setting in for these machines. Already there are fourteen dairies fitted up with them, and the agents have received signed orders for twenty nine additional plants. During the past six or eight months, various public demonstrations of the working of the Lawrence Kennedy machine have been given at farms, where they are in daily use, and all those present have been highly pleased at their success. Within the course of the next year or so, I think most of the leading dairy farms will be fitted up with these machines.

A HARD BRICK.

From the Clay of the Cape Flats.

A correspondent writes:—"I have had the pleasure of visiting the brick works erected by Mr. Houlden of the Lancashire Brick and Tile Company on the Cape Flats near Maitland. At my visit the first kiln was still burning, but I was able to get out a sample brick, from which it is quite clear that a brick can be produced from the ordinary clay of the Cape Flats as hard as any that can be imported. It strikes fire with a piece of steel, and rings like hard stone. Draining pipes, of which the present cost is so high that they are practically beyond the reach of the farmer, are also manufactured at these works, and they seem as hard and good as the bricks. *No cinders nor ashes are used with the clay.* The process of manufacture is this:—The clay is first ground, then sifted,

and after being *moistened only* with water, is subject to a pressure of 40 tons. This turns out a brick, which before being burned, has much the consistency of soap stone. It is put in this state into the kiln, without being dried, and as I said, the product is a brick, which to anyone familiar with the ordinary bricks produced from the clay of the Cape Flats, is one of most astonishing hardness.

It has been held that such a brick could not be produced in this country, that whereas certain countries are clay countries such as the Great Valley of the Amazon, others are sand countries, that is to say countries where there are no slow moving rivers, to produce the deposits of clay and silt, which we see in the Thames Valley for instance. It is evident from the inspection of these bricks, that art is able to make up for the deficiencies of nature. Whether in the long run with the high cost of labour and fuel at the Cape, this brick can be produced at a cost to compete with the imported brick, is another matter, but one which it is of interest to farmers to note, more especially with regard to the manufacture of drainage and irrigation pipes."

Let us hope that others will follow Mr. Holden's example and that we may soon be able to reckon hard bricks, tiles, pipes and all earthenware as outside that terrible indictment—"everything imported, nothing produced in the country."

Samples of these bricks and pipes can be seen at the office of the Commissioner of Public Works, Grave Street, Cape Town.

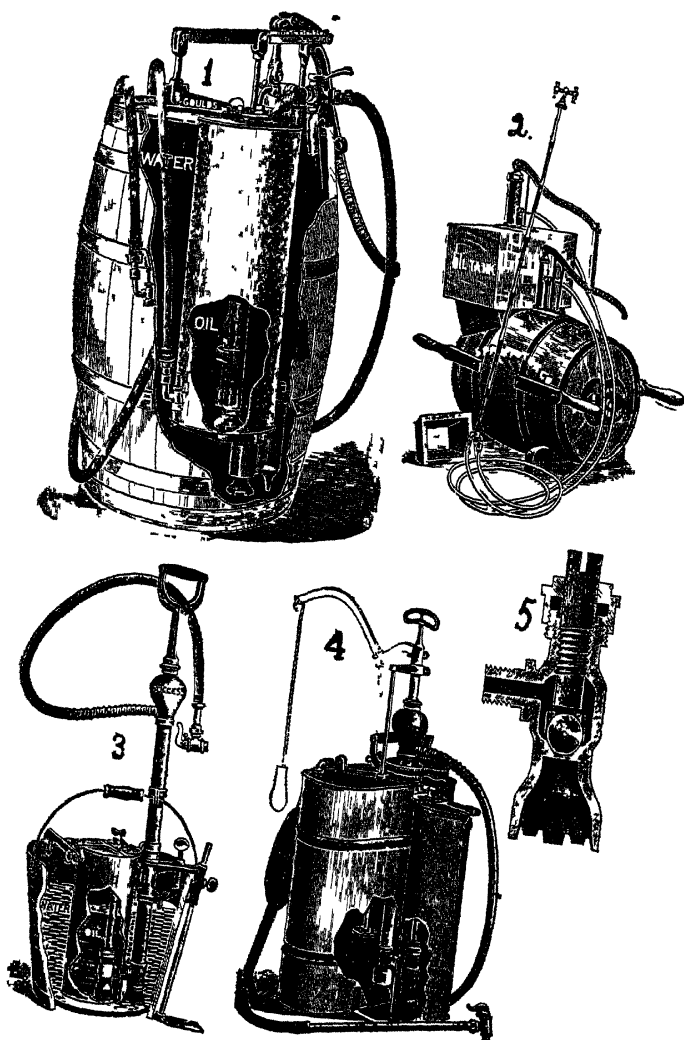
While there are a good many advantages on the side of the large central creameries, there are also some on the side of the local creamery. Mr. M. A. Leighton, in "Chicago Produce," says the most successful creameries are those where the patron in person delivers his milk or cream at the factory. This is because patrons are so much better satisfied when they see the cream or milk weighed and the samples taken for testing by the man in charge of the creamery.

Where horses have their fodder given to them in the form of chaff or finely-cut mixtures, they are usually found much more liable to suffer from colic and other intestinal disorders than when the hay is fed in its natural condition. When this short, chaffed fodder is given, there is a tendency on the part of the horse to bolt its food, or at all events to consume it without first subjecting it to proper mastication. The consequence of this is imperfect digestion, which often leads to internal complications, one of the most common of which is colic. Where horses which are fed on chops of this kind show special liability to colic attacks, good results are often obtained by feeding the hay given to the animals in its "long" or natural condition.

RINDERPEST STATISTICS.

MADE UP TO OCTOBER 23rd, 1902.

District	No. of centres reported since Sept., 1st. 1902	Approximate total loss since com- mencement of outbreak	No. of cattle in affected herds	Percentage of Mortality
Aliwal North	10	171	584	29.2
Albert	5	109	1397	7.8
Barkly East	9	353	1161	30.4
Barkly West	nil.	4	70	5.7
East London	3	35	750	4.6
Elliot	1	110	554	19.8
Engcobo	8	226	2091	10.8
Glen Grey	5	114	835	13.6
Hay	6	130	438	29.6
Herbert	nil.	79	431	18.3
Herschel	6	635	4581	13.8
Kimberley	1	10	205	4.8
Macleod	8	22	86	25.5
Mafeking	3	1576	6864	22.9
Queenstown	1	4	12	33.3
Taungs	1	503	3037	16.4
Tsomo	1	5	19	26.3
Umtata	1	44	65	67.6
Vryburg	nil.	228	1311	17.3
Wodehouse	8	166	1935	8.5
Xalanga	nil.	6	49	12.2



OIL WATER SPRAY PUMPS.
 Figure 1, Kerowate , 2, Spramotor, 3, Success, 4, Weed; 5, Oil-valve]
 of Deming designs.

THE PLAGUE OF TICKS.

OIL-WATER PUMPS.

FOR SPRAYING CATTLE TO DESTROY TICKS.

DIPPING V. SPRAYING.

BY C. P. LOUNSBURY, Govt. Entomologist.

The least satisfactory factor in oil-water spraying for the destruction of ticks is the apparatus for mechanically pumping the oil and water from different receptacles and then delivering them mixed in the desired proportion. There is no difficulty in mechanically mixing the two fluids and delivering them in a finely broken condition through the spraying nozzle; the difficulty is in getting them in a *constant* ratio to one another.

The value of paraffin oil (or kerosene) as an insecticide has long been known. For an indefinite period it has been the practice of some gardeners in different parts of the world to apply paraffin with water against plant insects. Generally about one part of oil to twenty-five of water is used and these applied by a hand syringe immediately after mixing the two by churning them violently together. As the two begin to separate as soon as the agitating ceases, about half the sprayer's time is spent in keeping them mixed. In the early seventies, emulsions of the oil with soap and milk came into vogue. These freely mixed with water, and hence are easily sprayed; but they are some trouble to prepare and in several respects are inferior to mechanically mixed oil and water, especially for tick destruction. Pumps to deliver a mechanical mixture, then, have come to fill a much felt want. They are all of comparatively recent origin and none, I regret to say, are wholly satisfactory. But one being a necessity for oil-water cattle spraying, a choice must be made amongst those now to be bought; and it is for the object of assisting the farmer in making his choice by giving him a description of the principal designs that this article is written.

The first oil-water pumps, put on the market in 1894, were very crude affairs compared with the models now offered, but even with them the value of the mechanical mixture against cattle ticks was demonstrated. As early as May, 1894, Professor H. E. Weed of the Mississippi Agricultural Experiment Station published that he found equal parts of oil and water successful. In the following year the Denning Pump Company had an apparatus on the market and, as a result of tests by Professor Weed, definitely recommended the use of

30 per cent. oil for "lice on domestic animals," 40 per cent. for "ticks on cattle" and 50 per cent. for "lice on hogs." From year to year the Deming Company improved its apparatus and as the success of such a pump has become assured, several other manufacturing companies have followed the example of this pioneer.

The ideal pump for cattle spraying, to my mind, would be an apparatus capable of supplying two lines of hose, one on each side of the cattle race, with an unvarying percentage of oil in the mixture, and which would not easily get out of order in ordinary usage. No pump yet made fulfils these seemingly simple requirements but it is not too much to expect that material improvements on the best of the present pumps can and will be made, particularly if cattle spraying becomes common.

During the past year oil-water pumps of the following designs have been carefully tested by me; namely,—the "Weed Kerosene Sprayer," the "Success Kerosene Sprayer," and the "Peerless Kerosene Sprayer" manufactured by the Deming Company of Salem, Ohio, the "Kerowater" manufactured by the Goulds manufacturing Company of Seneca Falls, New York; a "Spramotor Combination Outfit" manufactured by the Spramotor Company of London, Ontario; and the "Douglass Patent Syphon Pump" manufactured for the Hon. Arthur Douglass of Heatherton Towers, Albany District, C.C. There are only a few other oil-water pumps made and there is none amongst them, so far as I know, that are any better than those to be here mentioned.

THE DEMING OIL-WATER PUMPS

are made in several sizes but all on the one principle. The oil and water are drawn by a common piston, and the ratio of oil to water is controlled by a rod that screws down on the ball valve of the oil vent as shown in figure 5 of the accompanying plate. A pointer attached to the top of the rod indicates on a dial the percentage of oil the valve is set to pass. The two liquids mingle in the cylinder of the pump and finally emerge through the spraying nozzle in a most intimate mixture. The Deming "Success Kerosene Sprayer" and the "Weed Kerosene Sprayer" are, I believe, the most perfect and reliable oil water pumps that have yet been manufactured. In figure 3 the "Success" is shown standing in a bucket as intended for use. The oil, it will be noticed, is contained in a small metal (copper) tank attached to the pump cylinder. The great disadvantage of the apparatus is its very limited capacity, and this practically unfits it for cattle spraying on any but a small scale. The water or the oil would require replenishing after the treatment of every five or six head of stock. The pump complete is sold in Cape Town, for £2 5s. Anyone purchasing one for cattle spraying should get a twelve foot length of hose to replace the short piece furnished. South African cattle move their feet too quickly to trust a bucket very close to them.

The "Weed Kerosene Sprayer," shown in figure 4, is practically the "Success" pump fitted into a copper knapsack. The agitating attachment shown in the illustration is unnecessary in oil-water spraying and may be removed. This form of sprayer works quite as well as the "Success" and is a commendable form for the treatment of dairy stock in stables or tied close to a post or wall, providing always that the farm labourers can be induced to shoulder the weight. The pumping parts are removable from the knapsack. Complete, as shown in the illustration, the apparatus sells in Cape Town for £4 15s.

The "Peerless Kerosene Sprayer," not shown in the illustration, is a large model designed for extensive work. It is made to stand in a barrel and can be used for one or two lines of hose. Unfortunately it fails miserably to uniformly deliver the percentage of oil, even approximately, indicated by its valve gauge. The principle of its action is the same as in the small pumps but owing to the great difference in levels the two liquids may attain in its use, combined with certain other interfering factors that are less easily corrected and which are far more important in a pump of large capacity like this than one of small capacity like the "Success," the delivery of oil may vary fifty or more per cent with the valves fixed. The pump works more uniformly when the detachable air chamber is removed as this vessel tends to collect pure oil. Used without the air chamber and with the precautions to keep the liquids at about the same level and to preserve an even pressure, the pump delivers a fairly uniform ratio of oil and water. A different ratio, however, is obtained with one nozzle operating than with two, and, altogether, variations in the uniformity of the percentage of oil are so easily produced that I consider the apparatus undesirable for spraying either trees or animals. It is only fair to add that the pump without the oil attachments, which are easily removable, is an excellent one for applying simple insecticides and fungicides. It is made of good materials well put together. None fitted for oil spraying are to be had at the Cape but the cost of one landed would be about seven guineas.

THE GOULDS "KEROWATER" PUMPS

are on an entirely different principle than the Deming designs. They are made in three forms, one a knapsack, the second a barrel mounted pump, and the third a large tripod pump that draws from two vessels. I have tested only the barrel pattern, or "Kerowater" as the makers term it, but what applies to one in the matter of reliability applies to all three. The Kerowater is illustrated by figure 3. It is in reality two pumps worked by a common handle, one raising water from the barrel itself and the other raising oil from a galvanized iron tank set in the barrel. The oil and water mingle as they enter the hose and are thoroughly mixed by being broken into spray together at the nozzle. The percentage of oil may be varied from five to twenty-five per cent, or any intermediate multiple

of five, by shifting a pin that regulates the length of stroke given to the oil piston rod. At first thought it seems as if the Kerowater was a nearly perfect apparatus and one not easily thrown out of order; but experience in testing it has taught me that it has a number of annoying faults. It does not give the proper proportion of oil from the start. It is almost impracticable to keep the pumps so that neither leaks through the valves or plunger packing when the pressure is heavy, and if they leak at all and not in precisely the proper ratio the percentage of oil in the discharge is materially affected. However tight the pumps, water is forced into the oil air chamber when the gauge is set for a low percentage of oil; and if the valves are not tight and the oil is exhausted water may be actually forced into the oil tank. Under heavy pressure one cannot always tell by the working of the pumps when the oil has run out. When two leads of hose are used the dividing joint must be absolutely level as otherwise much more oil may go into one hose than into the other.

However, one can get a fairly constant percentage of oil from the Kerowater after its weak points are understood and when the precautions they suggest are fully observed. The pump has met with a large sale in America, having been rather extensively used for the last two or three years for the application of diluted crude petroleum to fruit trees. Though more reliable in its work than the Peerless Kerosene Sprayer, it does not approach the latter in point of construction. The castings are of inferior metal and are exceedingly clumsy and one really marvels at the incongruity of some of the fittings. Only two of the pumps have been imported to my knowledge. One of these is for sale. It has been little used and is now in good order. Should any reader like to buy it he may address the writer. The cost of a new pump, complete with two lines of hose, landed at Cape Town would be about six pounds ten shillings.

THE "SPRAMOTOR COMBINATION OUTFITS."

The Spramotor Company had a single pump with a paraffin attachment on the market a year ago, but it is not advertised in the latest catalogue and hence has probably been withdrawn. To judge from the figure that was published of it, it could not possibly have been reliable in its action. Now the company advertises "Spramotor Combination Outfits" for oil-water spraying. These consist of two of their ordinary spray pumps with the handles connected as shown in figure 2 of the plate. One pump raises water from a barrel and the other oil from a box resting on the barrel. The principle of the action is essentially the same as in the Kerowater. The two liquids are not allowed to mix in one hose however, but are carried in separate tubes to the spraying nozzle. The apparatus illustrated is fitted for tree spraying and has a bamboo extension pole. This pole contains two tubes, one within the other for the passage of the oil and water respectively. For

cattle spraying the pole would, of course, be much shortened or wholly dispensed with. The manufacturers claim much for the feature of keeping the liquids apart but by careful tests I have been forced to conclude that its disadvantages outweigh its advantages in connection with their pumps.

The Company offers a choice of fine combinations of barrel mounted pumps and a combination knapsack pump in addition. My tests were limited to the combination of two of their "No. 1" pumps, but it is obvious that all the combinations have the same failings. The failings are practically those found in the Kerowater above described. There is, also, no index to guide the operator in making a combination of the handles to secure any desired percentage of oil, which must be considered a fault as the possible combinations are very numerous. As in the Kerowater a fairly constant percentage of oil can be obtained when once the vagaries of the apparatus are understood and precautions against variations taken. Two separate deliveries for cattle spraying could be easily supplied by the combination of two No. 1 pumps, or of a No. 1 for water with a No. 0 for oil which is really better. The construction and workmanship of the Sframotor pumps are truly excellent, and the design of the company is evidently to produce a superior article. Large numbers of Sframotor combination outfits for applying crude petroleum with water are reported to have been used last winter in the United States and Canada and to have thus earned an enviable reputation. Only the one outfit has been brought into the Colony. The expense of an outfit consisting of a No. 1 pump with a No. 0 pump and two lines of hose for cattle spraying, complete with the water barrel, oil box and other necessities, would probably be between nine and ten pounds landed here.

THE "DOUGLASS SYPHON PUMP."

The Success Kerosene Sprayer was tried by Mr. Douglass when he first began to spray with mixed oil and water (see *October Journal*) and through a fault which I believe was wholly due to a defect in the particular pump he had, it failed to give him satisfaction. Thereupon he set to work to design a pump to better meet the requirements of cattle spraying. The ultimate result was the apparatus which bears his name and which is here honoured with a full page illustration. This apparatus was patented and arrangements made for its manufacture. It may be bought of T. H. Parker & Co., Grahamstown, Dyer & Dyer, King Williams Town, C. Howie & Co., Kimberley, and L. Crowe & Co., Port Elizabeth. The price for the pump with hose, nozzle and measure glass is £4. One on each side of a cattle race is necessary.

The main part of the Douglass Syphon Pump is the same as the corresponding part of the "Success" and is made to stand in a bucket. The oil and water are drawn up together as in the "Success," but the oil instead of coming from an attached tank comes from a second

bucket (or a paraffin tin) through a J-shaped tube. The ratio of oil to water is controlled by a simple stop-cock. Practically as uniform a proportion is obtained as with the "Success" pump, the fluctuations caused by difference in pressure and levels of the liquids seldom exceeding two per cent one way or the other. Notwithstanding its limited capacity, I consider the pump the most satisfactory for race spraying of all the kinds described. Work with it may be facilitated by lashing it to a low post sunk by the side of the race, thereby obviating the use of the foot-rest.

ALL OIL-WATER PUMPS

should be carefully tested at the farm to determine the error, if any, in the gauge indicator marked by the manufacturer. In the Deming pumps an error can generally be rectified as the indicator is adjustable; in the Douglass pump the quadrant may be marked anew, but in the Kerowater the apparent error should be noted and always allowed for when the pump is fixed to give a required percentage. Apart from the primary test, every pump should be roughly tested frequently when it is in use in order that any serious variation in the percentage of oil may be discovered before much reliable spraying can have been done. In the illustrations of Roberts' race in use (see *October Journal*) may be seen two bottles re-ting in a rack on the pump barrel. These bottles are graded to show percentages from the top. At intervals, while the cattle are being changed and the pump is working smoothly, one of the bottles is filled at each nozzle, all the flow being caught without any change in the pumping stroke. Before filling a little salt is put in each bottle and this has the effect of causing the liquids to quickly separate. The bottles are replaced in the rack and in a few minutes all the oil is at the top. If either bottle shows too much or too little oil, work is at once stopped and the cause of trouble sought.

A test glass is furnished with the Douglass pump but not with any of the others. Substitutes can be made at home out of bottles. It requires some care to get them accurately divided yet with the aid of a medicine glass and with a file to do the permanent marking several can be made in an evening. Divisions showing five per cent on the upper fourth of the bottle are all that are required for ordinary purposes.

The hose for use with oil-water pumps should be of the best quality and of the smallest bore obtainable. Three-eighths inch hose is as small as can usually be had but one quarter inch is better, and one-half inch is the largest that should be accepted. Oil softens and destroys rubber, particularly under pressure, but small bore hose of the right quality will wear many months. Lengths of twelve to fifteen feet are required.

The oil separates from the water in the hose and pump when pumping ceases and hence the first few strokes after starting up each time

had best be turned into a special bucket and not on to the animals as the mixture is likely to lack uniformity. The smaller the bore of the hose, the less is the quantity that is unreliable. The use of two tubes, as in the "Spramotor" outfits, does not prevent an uncertain admixture at the start unless both pumps are balanced perfectly.

An effort should be made to pump evenly and always to the full stroke in oil-water pumps, and in all single pump designs, that is such as the Deming outfits and the Douglass, to keep the oil and water at about the same height. The strainers at the intakes should be examined occasionally to see that they are not clogged, and if water or oil containing chips or foreign matter of any kind is used, it should be strained through a fine sieve. The success of the spraying may depend on the care bestowed on these little details.

DIPPING *Versus* SPRAYING.

After long years of experimentation it seems, from the reports that reach us, that a really successful cattle dip for the destruction of ticks has been evolved in Queensland. The dip is composed of 8lbs. white arsenic, 4½lbs. caustic soda, 2½ gallons of Stockholm tar, and 8lbs. of tallow long boiled in 400 gallons of water. At Nel's Rust in Natal a plant for dipping cattle with this compound (or a very similar one) has been in use for the last six months and the results are said to be highly satisfactory. And within the last three months a number of tanks copied after the Natal one have been constructed in various parts of Rhodesia. The species of tick concerned in Queensland, Natal and Rhodesia is the ordinary Blue Tick but there is no reason to suppose that the Bont Tick would not be equally affected by the compound used. I have not examined cattle that have been dipped, and hence I am not in a position to say that the results are as good as with oil-water spraying but the reports are quite uniformly to the effect that few or no ticks escape destruction.

The advent of a successful dipping compound raises two questions before the stock farmer who proposes to take active measures on approved lines against the tick pest, namely: "Shall I spray or shall I dip?" and "If I spray shall I use oil-water or the new dipping compound?"

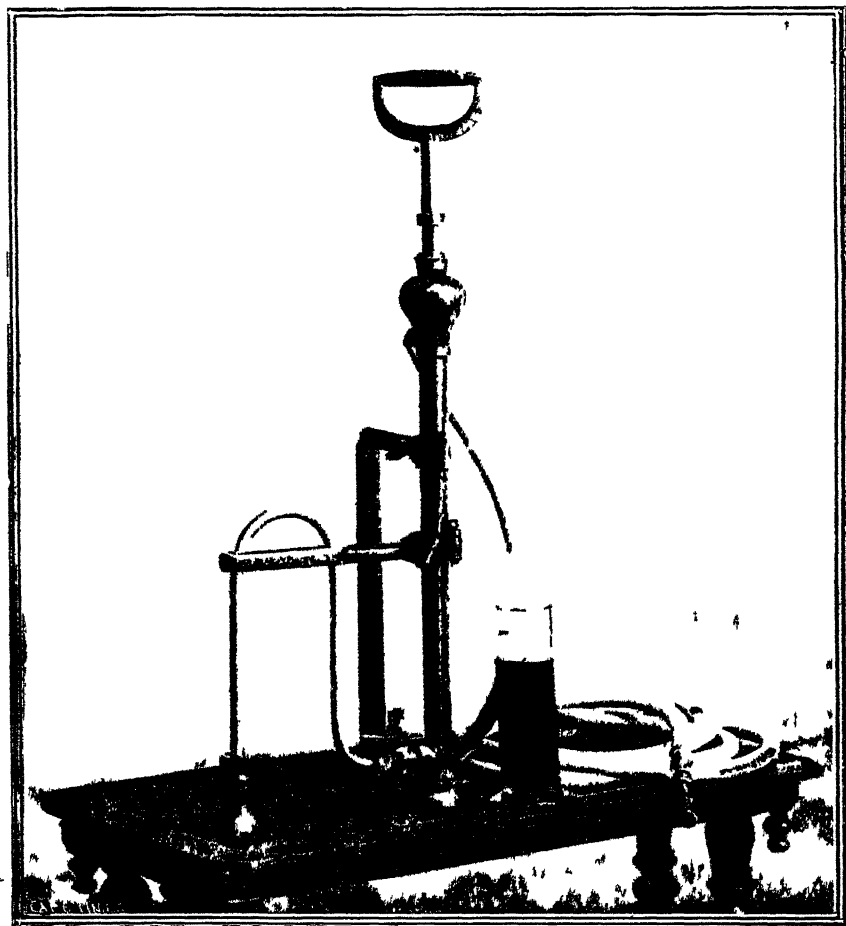
In treating of tick destruction by oil spraying in the last issue of this *Journal*, I purposely refrained from making any mention of dipping and from suggesting that any material might replace the oil-water mixture. There were, of course, good reasons for the omissions. The position is that oil-water spraying has been proved a success in the Colony whereas the Queensland tick wash has not yet reached the experimental stage with us, either as a spray or a dip. So far as spraying is concerned a race and pump are requisite whether oil-water or the Queensland wash is used so little is lost in outlay and valuable time may be saved by the farmer who starts in

now with the former remedy. Oil-water pumps can be quickly converted into simple pumps if the arsenical wash is later adopted.

Nothing that is here said, or was said in the article referred to above, is meant to be interpreted as placing spraying above dipping. I believe that there is a grand future for dipping in the Colony, if half what is claimed for the Queensland dip at home proves true under our conditions. But on the same sound business principles on which we go ahead installing telegraph wires after their dispensableness has been shown by Marconi, it would at present be folly to forego the oil-water mixture and spraying and plunge into dipping. After dipping in the Queensland wash has been well tested at the Cape and proved *harmless in the long run to the animals, and effective against our kinds of ticks*, it will be timely to recommend dipping in place of or as an alternative for oil-water spraying.

Extensive trials of spraying with, and dipping in, the Queensland wash are much needed, and it is sincerely hoped that farmers here and there through the tick districts will carefully and intelligently, though cautiously, follow the Queensland example, and make public the results of their experience. Our Agricultural Department will gladly furnish such farmers with full particulars in regard to the details of the operations. Many, I know, will impatiently ask why the Government does not acquire the experience for them. The Government, probably, will actively experiment but a long and varied practical experience such as the Government is not in a position to obtain is requisite. It must be shown if arsenical washes are uniformly effective in all the ranges of season and weather in which tick destruction is required; and whether or not there is any cumulative poisonous effect on the animals. Queensland experience of the last four years will serve as a guide to us but must not be depended upon too closely; it at least shows that the lives of the animals are not seriously endangered and that the general effect on the ticks is gratifying to the farmer.

When the needful Cape experience with dipping has been gained I deem it likely that we shall conclude that there is need both for dipping and for spraying, that one or the other will be the more economical according to local conditions and private circumstances. If the Queensland wash is found to answer as a spray, the expense of spraying will be materially lessened.



DOUGLASS PATENT SYPHON PUMP

REDWATER IN RHODESIA.

THE VIRULENT OUTBREAK

ITS HISTORY AND TREATMENT.

INOCULATION AND DIPPING.

REPORT BY CHAS. E. GRAY, M.R.C.V.S.,
Chief Cattle Inspector, Rhodesia,

AND

WILLIAM ROBERTSON, M.R.C.V.S.,
Bacteriologist to Veterinary Department Cape Colony.

(The attached report and illustrations are reproduced by special permission of the B.S.A. Co)

The disease popularly designated as Redwater in South Africa is one known in every quarter of the Globe, and has, within the past ten years, received considerable attention from scientific observers in all parts of the world.

In Texas, as Texas Fever, it formed the subject of Drs. Smith and Kilbourne's classical report. In the Argentine Republic, under the name of "Tristeza" M. Ligniere has devoted much time to its investigation, and in Queensland as "Tick Fever" it was dealt with by Hunt and Pounds.

Briefly it may be described as a disease affecting cattle, due to the presence of a parasite in the red blood corpuscles (*Piroplasma Bigeminum*) is not directly contagious from animal to animal and is spread mainly, if not altogether, through the agency of the cattle tick.

The organism is found in all the tissues of an affected animal, the female tick feeds upon that animal, becomes engorged with its blood, drops off and lays eggs in the sand which hatch out and these seed ticks, the progeny of the infected female, transmit the disease to clean cattle.

The following summary by Drs. Smith and Kilbourne, America, clearly describes the nature and characteristics of Texas Fever or Redwater:—

1. Texas Fever is a disease of the blood, characterised by a destruction of the red corpuscles, the symptoms are partly due to anaemia produced, partly due to the large amount of debris in the blood, which is excreted with difficulty, and which causes derangement of the organs connected with its removal.

2. The destruction of the red corpuscles is due to a micro-parasite or micro-organism which lives within them. It belongs to the class Protozoa, and passes through several distinct phases in the blood.

3. Cattle from permanently infected territory, and though otherwise healthy, carry the micro-parasite of Redwater in the blood.

4. Redwater may be produced in susceptible cattle by direct inoculation of blood containing the micro-parasite.

5. Redwater in nature is transmitted from cattle which come from the permanently infected territory by the cattle tick.

6. The infection is caused by the progeny of the ticks which matured on infected cattle, and is inoculated by them direct into the blood of the susceptible animal.

7. Redwater is more fatal to adult than to young stock.

8. The diagnosis of Redwater in the living animal can be rendered certain by microscopical examination where possible.

As Redwater has been known for the past years in various cattle raising countries, the history, symptoms, *post-mortem* appearances, as well as the part played by the cattle tick in its spread, have been clearly worked out, and when the data of the present outbreak in Southern Rhodesia is compared with those which occurred in Australia, America and the Argentine, it can be seen that although certain *post-mortem* symptoms are different in this outbreak, the main train of symptoms and *post-mortem* appearances are the same.

HISTORY OF THE DISEASE IN RHODESIA.

Although the mortality amongst stock in Rhodesia from this disease did not rise to epidemic proportions until the present season (1901-1902) localised outbreaks of Texas Fever have been recorded from time to time for the past ten years, and there is no doubt that of late the gradual infection of the country generally, and of the transport routes and town lands in particular, have become so far established that all that was necessary to give the disease an impetus was the occurrence of a season which should be particularly favourable for the propagation of that tick (*Rhipicephalus Decoloratus*) which is responsible in South Africa for the dissemination of Redwater infection, given local conditions in any part of Rhodesia which might promote the multiplication of these pests in whatever locality these insects might appear in excessive numbers, there an outbreak might be looked for, and in effect this is exactly what has happened during the present year.

How the infection was first established it is difficult to demonstrate conclusively, but looking back at the early records of Redwater outbreaks in Rhodesia, it may be surmised that transport cattle

coming from districts where the disease is endemic, like Natal and the Transkei, are probably responsible.

Ever since the occupation of Rhodesia, animals of this class, carrying in the blood the germs of the disease in its resting stage have moved and grazed along the transport roads, and as the progeny of ticks maturing upon such animals are infective, and can communicate the disease to susceptible stock, it may easily be seen how the seeds of Redwater were sown widely throughout the Territory. Against this theory one might argue that if such be the case, it is strange that the disease has not attracted the attention of the public before this, but it must be borne in mind that Rhodesia, unlike the proverbial happy country, has had a rather eventful history. First there was war and locusts, then came rinderpest which practically denuded the country of stock, this was followed by a rebellion which at one time threatened to send the white settlers after the cattle. Taking these facts into consideration, and in addition to these the fact that those men to whose stock the loss from Redwater could be chiefly confined were transport riders whose nomenclature of diseases of animals is generally based on the observation of the most notable appearance on *post-mortem* presented by the animal which is the subject thereof, it is not difficult to see how a disease of this description might be fairly prevalent and yet pass unnoticed by the general public, so long as only one or two oxen dropped out of a span, many such cases being doubtless attributed to poison. There is no doubt that the appearance of Redwater in what might be called an epidemic form was materially retarded by the ravages of rinderpest, as the absence of stock deprived the ticks of their only possible source of infection.

The view herein expressed, that the disease has existed in sporadic form almost ever since the settlement of the country, is confirmed by information furnished by Colonel Napier, of Bulawayo, who has recorded an outbreak in the Hartley and Salisbury Districts in 1891, which was undoubtedly one of Redwater, describing the disease in the following terms:—

“April 14th. Colonel Napier reporting re sickness amongst cattle at Salisbury and Umtali and enquiring if there is any resemblance or even if the diseases are not synonymous. At Hartley Hills 1891 and also Salisbury. Lost five spans out of six. Appearances, hanging look, general depression, feverish look about the eyes, eats until close on death, bowels loose, sometimes the reverse, in most cases passing blood in urine, in several instances cattle mad and violent and charging people just before death, invariably covered with ticks. *Post-mortem*, yellowish watery fluid under skin of abdomen, gall discoloured, liver and spleen enlarged and affected, coagulated fluid attached to diaphragm. At the time Napier was under the impression that disease resembled blackwater fever in man and found that in removing cattle to sand veld past Charter there were no more deaths.”

After this a blank occurs in the history of Redwater which is filled in by war, rinderpest and rebellion, but the thread is again taken up directly after re-stocking began in 1897 when Redwater appeared at Bulawayo amongst a lot of cattle which had been subjected to protective inoculation against rinderpest, many of which died. From this time onward sporadic cases of Redwater appeared in various parts of Rhodesia, and the Umtali district in particular acquired the reputation of being one in which the occurrence of the disease was far from uncommon. It was only in the year 1901 that the disease began to excite particular comment and the circumstances which gave rise thereto was the shipment to Beira, at the instance of Mr. Rhodes, of a cargo of cattle from New South Wales, intended for restocking purposes.

On account of railway washaways and other unavoidable accidents, these animals were detained in Beira for between two or three weeks, and during their detention, Redwater, contracted while grazing upon the Beira flats, appeared among them. The Veterinary Staff, then called in consultation, recommended that the survivors, to the number of about 800 should be sent forward to Umtali with all possible despatch as the death of the whole shipment appeared inevitable if they remained longer at Beira, while it was hoped that a proportion might survive if shipped to the higher veld of Umtali. This was accordingly done, but the mortality was practically unchecked by the movement of the animals, and while confined to a portion of the Umtali Commonage, and an adjoining farm, they melted away until but three were left alive out of the whole shipment.

The deaths of so many highly susceptible cattle within a comparatively small area, did much to heighten the general infection of the town lands at Umtali, and to pave the way for the serious epidemic which occurred there during the next season, and it is worthy of note, that as the disease spread through the Australian herd it exhibited the following characteristics. First, the most susceptible animals which fell victims shortly after the disease appeared, presented all the usual clinical and *post-mortem* appearances found in Redwater, as described by Smith and Kilbourne, Hunt, Ligniere and other writers. These animals died at the height of the disease and most suffered from hæmoglobinuria, but as time went on and those of the herd which possessed a higher degree of immunity ultimately fell victims to the infection, the symptoms displayed and the lesions found on *post-mortem* were not so distinctly characteristic of Redwater, and presented deviations from the normal type; many being considered by the Veterinary Surgeon in attendance to be cases of gall sickness (a vague term commonly applied to any disease in South Africa where there is marked derangement of the liver). During the outbreak amongst the Australian animals they were kept rigidly confined to certain grazing grounds, none of the local cattle being allowed to mix with them, and no particular mortality amongst animals belonging to private owners was recorded.

Almost simultaneously with the outbreak at Umtali, a number of sporadic cases of Redwater appeared at Salisbury, 180 miles distant on the Town Commonage, in the Makabusi Valley, and about the same time Redwater was reported at Charter, some 60 miles further on, amongst stock brought from Bulawayo.

This time last year at Bulawayo another outbreak also occurred amongst cattle introduced from the Cape Colony by rail, in the course of which some 85 head perished, and it is of interest to note that our informant, who describes at considerable length the *post-mortem* appearances presented by the victims, dwelt particularly upon certain unusual lung lesions, which to his mind shewed conclusively that the disease from which the animals suffered was not Redwater.

This closes the record of Redwater outbreaks until the appearance of the disease in what might be called its present epidemic form. This outbreak dates from about the beginning of last wet season (*i.e.* November) which was characterised in Umtali and Salisbury both, by the appearance of ticks in abnormal numbers, and shortly after its commencement a severe outbreak of typical cases of Redwater broke out at Salisbury at first mainly affecting cattle recently introduced from the Cape Colony, but afterwards extending to animals which had been in the district for years and which grazed in the Makabusi Valley where cases had occurred the previous season.

Somewhat earlier than the Salisbury outbreak, a still more severe one began in Umtali amongst animals pastured on the commonage, and through their agency it extended along the roads to Melsetter (80 miles) and Penhalonga (12 miles). The line of medicinal treatment suggested by Dr. Hutcheon, Chief Veterinary Surgeon, Cape Colony, the administration of calomel, quinine, carbolic acid and linseed oil, was adopted generally throughout the district, and it was reported that at Melsetter this treatment was conspicuously successful, though only indifferent results were obtained in Salisbury. As time went on what had been noticed in the outbreak amongst the Australian cattle the previous season, was again observed; cases at Salisbury and Umtali which seemed to deviate considerably from the normal type began to appear, and when the attention of the public was drawn to the existence of this class of cases, considerable uneasiness was manifested, many Umtali stockowners, who were unable to understand the reason of their occurrence, expressing an opinion that "a new disease" as they called it, had been imported from Australia.

Post-mortem appearances not placed upon record in any literature on the subject of Redwater were also observed, and subsequently public agitation became so pronounced and emphatic, in spite of the repeated expressions by the Veterinary Department that the whole train of symptoms might be attributed to Redwater infection of a severe type, that the Colonial Government, who were then approached, agreed to co-operate with the Rhodesian authorities in making a thorough investigation into the whole matter.

CLINICAL SYMPTOMS.

As it will be found on further perusal that the cases to be considered may be divided roughly into two classes, in much the same way as is done by M. Ligniere, a class of typical cases, such as were not commonly observed at the commencement of the present outbreak, and a class of atypical cases whose numbers increased as the epidemic progressed.

It would be as well to begin with a description of a typical case of Redwater. In this form of the disease, after an interval of two or three days in which the only evidence of systemic disturbance is an elevation of temperature, in many cases rising to 106° F or 107° F, a train of symptoms are presented of which the following are the most characteristic.

The animal is dull, and the appetite capricious, although the act of rumination may be performed at intervals; in milch cattle there is a sudden falling off in the quantity of milk, while pregnant animals frequently abort. There is marked salivation and grinding of the teeth with occasionally a slight flow of tears from the eyes, which have a somewhat glassy appearance, the bowels are generally extremely constipated, although in some cases diarrhoea is present, and when it is, the discharges are dark in colour assuming a reddish brown tinge when dry. When made to move the animal does so unsteadily, the hind quarters swaying as if it had not complete control of its limbs, the swaying being most noticeable when the animal is turned sharply round. As the disease progresses the animal becomes greatly depressed, refuses all food, is disinclined to move, salivation is profuse, tremours of the muscles of the shoulders and flank are frequent and the urine is often, but by no means invariably, discoloured, having at first a pinkish tinge which later becomes red, and finally porter coloured and highly albuminous, frothing up when voided. At this stage brain symptoms may appear, the animal charging recklessly at any moving object coming within range of its vision and expiring in apparent delirium, on the other hand the animal may die quietly without a struggle, death occurring in from five to ten days after the visible onset of the disease, or it may rally from the acute stage, the urine may clear off and become normal in colour, while the appetite remains in abeyance, and the animal die in the course of a few weeks from anæmia.

So much for a typical case; but in atypical cases the symptoms are by no means so diagnostic. In these there is in the early stage marked elevation of temperature, 106° F. or over with at first comparatively little indication of systemic disturbance. The salivary secretion is slightly in excess. The animal continues to eat and the bowels are practically normal, although close observation will show that the dung is frequently somewhat glazed in appearance and streaked from excess in the amount of mucus. The urine has sometimes a somewhat milky appearance at the onset, but frequently remains normal throughout the course of the disease, and the gait,

although somewhat rather unsteady, is not markedly so. In cases of this class animals frequently survive the febrile stage and apparently become convalescent, but suddenly collapse and are found dead with a heap of albuminous froth exuding from the nostrils. Occasionally this preliminary stage of illness is quite overlooked and the animal is found dead having apparently died suddenly from pulmonary effusion.

Not unfrequently lung disturbance supervenes before the temperature subsides, nasal hæmorrhages occur with discharge of bloody froth from the nostrils and the animal manifests great distress, coughing in a manner which might lead to the supposition that lung-sickness was also present. So extreme does the difficulty of breathing become that not only does emphysema of the lungs result, but we have on more than one occasion observed extensive emphysema of the subcutaneous tissue, not as a *post-mortem* appearance, but during the life of the animal, possibly as a secondary corollary to pulmonary emphysema, the subcutaneous swelling crackling upon pressure like those of quarter evil. If death does not occur at this stage, a type of broncho pneumonia, associated with pleurisy, generally supervenes, and the animal may die from this cause, or may ultimately recover, although cases of recovery when lung complications make their appearance are extremely rare.

Instances in which no visible indisposition has been observed, and in which the animal is found dead with a frothy discharge from the nostrils are, we believe, cases of some standing which have passed unnoticed through the febrile stage, and collapsed subsequently, when secondary pulmonary œdema sets in. As a proof of the probable correctness of this supposition, an animal was picked out of a herd as being slightly indisposed, although his appetite was good; his temperature being found to be high, he was kept under observation and he evinced no marked signs of illness until the eleventh day when the morning temperature showed a rise. Then he became constipated and a dose of salts and calomel, which was given to relieve the constipation, put the animal off his feed for two days; when the bowels were relaxed, however, the temperature descended to normal, the appetite returned, and the animal to all appearance seemed well and remained so for a week, but was found dead, with froth flowing from the nostrils on the very morning that the assistant went to liberate him to allow him to run with the rest of the cattle.

In some atypical cases the duty undertaken by the kidneys in typical cases, of excreting the blood pigment derived from the broken down blood corpuscles, seems to be undertaken by the bowels, and in such, the dung becomes black and tarry in colour, and when bowel lesions are severe, extensive hæmorrhage sometimes results, apparently from perforation of the walls of the internal blood vessels by an ulcerative process, enormous clots of coagulated blood being passed off in the dung, or found on *post-mortem* in the lumen of the

intestine. The anæmia induced by these bowel hæmorrhages may, and often does, lead to death from exhaustion pure and simple.

POST-MORTEM APPEARANCES.

These vary in detail, but it is possible to have almost every organ of the body affected, more or less, and in general it is one set which show the lesions in the most marked degree, thus. The intestinal tract may be mainly involved, and the spleen and liver almost normal to naked eye examination, or the intestine may appear normal, and the spleen and liver enormously congested. The kidney lesion is extremely constant and the lymphatic glands almost invariably affected. Just as there are typical and atypical cases seen during life so typical and atypical *post-mortems* are to be met with.

The lesions on *post-mortem* all tend to the impression that this is a much more severe type of the disease than the Redwater met with in Cape Colony, and one lesion, viz., that in the lungs, we have not met with before in anything like so marked a degree.

TYPICAL CASE: POST-MORTEM.

Greater pallor of subcutaneous tissues and of the visible mucous membranes. If the carcase is well nourished the fat has generally a yellowish or brownish yellow tinge.

Spleen. Much enlarged, pulp diffuent and soft in appearance, it has been aptly compared to black currant jam, its colour being darker than normal and the white points or Malpugian bodies met with in a healthy organ obliterated by swelling of surrounding pulp. The organ may weigh from ten to fifteen pounds (normal weight $1\frac{1}{2}$ to 2lbs.)

Liver. Enlarged, more friable than normal, and of a mahogany colour on section, sometimes showing infarcts, (hæmorrhagic spots) due to blocking of the fine capillary blood vessels with organisms, or debris and disintegrated matter, as the result of their attack.

Gall Bladder. Has wall much thickened and cedematous, and frequently extravasations of blood, and even ulcers upon its internal mucous lining.

Bile. Yellowish red, or more commonly dark dirty green in colour, containing inspissated particles of bile pigment and much mucous, (this bile has been likened to chewed grass in appearance)

Kidneys. Softened and friable, structure is frequently hæmorrhagic, capsule easily stripped off, infarcts present, either recent, appearing as dark red spots on outside and in structure of organ, or of longer standing and white in colour, roughly spherical in shape, standing up from the surface of organ, and softer than surrounding kidney substance.

Intestines. Frequently congested, Peyer's patches enlarged and inflamed, sometimes covered with a yellow cropous exudate, and gut contains bile-stained mucous, cæcum often affected, diffuse conges-



FIG 1.—ANIMAL DEAD, SHOWING LESIONS FROM NOSTRILS POST MORTEM SHLWLD EXAMINATIVE LUNG LESIONS

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FIG. II.—NLABER VIEW OF FIG. I

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tion of lining membranes, ulcers may be found at the junction of the small and large intestines (ileo cæcal valve) the last part of the gut (rectum) shows congestion in striated marking on the mucous membrane.

Bladder. May contain normal urine, high coloured ditto, or water of the colour of claret or porter, owing to the presence of broken down blood which has been passed out by the kidneys and due to the destruction of the red blood corpuscles by the piroplasma.

Stomachs. First, second and third are normal, the fourth frequently shows general congestion, reddening and thickening of the mucous membrane, ulcers may be present at the edges of the mucous folds, and at the pyloric opening of the stomach (*i.e.*, the opening into the intestine), the stomach frequently contains semi-fluid food mixed with blood, and it is the presence of this lesion and the ulcers on the mucous membrane which might cause a careless, or incompetent observer, or one who only saw the fourth stomach, to confound the disease with Rinderpest.

The existence of any rinderpest infection complicating these cases has however, been disproved by the fact that, inoculation with rinderpest serum did not modify or prevent in any way the course of the disease, nor did cattle which had been salted to rinderpest during the 1897 outbreak which were then highly fortified with virulent rinderpest blood for serum producing purposes, possess any special immunity during the present outbreak.

Heart. Flabby and pale, fat around base of a yellow colour, and little red spots (petechiæ) on outer mucous covering (epicardium) and under inner mucous lining (endocardium) there may be small quantity of clear fluid in heart sac (pericardium).

Blood. Generally paler in colour than normal, and in advanced stages of the disease much diminished in quantity, and often so watery that it scarcely stains the fingers.

Lymphatic Glands. Enlarged, friable and in many cases hæmorrhagic.

THE ATYPICAL CASE.

In addition to the *post-mortem* appearances given above *i.e.*, the lesions in spleen, liver, kidney and heart (which are generally present) the respiratory tract may be the seat of the disease. The lining membrane of the nose (schneiderian membrane) is purple, dusky red, or dull blue in hue, the pharynx ditto, the trachea or wind pipe filled with a thick froth, and the lungs filled with a clear straw-coloured exudate, and showing much emphysema, so much in some cases as to dissect out the lobules of the lung.

The lungs are heavy, darker in colour than normal, and on cutting into the substance, froth, and this clear fluid exude.

A clear straw-coloured jelly-like exudate is around the base of the heart and enveloping the bronchial lymphatic glands which are much enlarged, and the exudate extends some distance up the neck in the jugular furrow.

Frequently there is a similar exudate around the lower end of the rectum and bladder, and the mesenteric and pelvic lymphatic glands are much enlarged, hæmorrhagic and friable.

In such a case as above, you frequently note froth issuing from the animal's nostrils immediately after death, preceded by a clear reddish yellow fluid.

The two modifications of the disease are quite mixed up and it is generally impossible, except in last stages, when an animal is sick, and even dying, to say whether the lungs are affected or not, and in a span of oxen dying from the disease half only may show lung lesions on *post-mortem*, or the whole lot may die, and not one shew anything abnormal in the respiratory apparatus. The number of animals which succumb to the disease shewing lung lesions on *post-mortem* we should estimate at from 30 to 35 per cent. Thomas Bowhill, F.R.C.V.S., in his article on Southern Cattle Fever, which appears in his Manual of Bacteriological Technique draws attention to the appearance of this same exudate in cases which he has met with in California, where severe lesions in the intestine are also to be met with, including the lesions on the mucous membrane of the fourth stomach.

"The lungs in some cases were emphysematous. Pleurisy was present and some infiltrations and hæmorrhages were sometimes found beneath the skin of the lower jaw and neck."

It is worthy of note that, when the exudation of straw coloured fluid is preceded by emphysema of the lung, it is along these emphysematous lines that the exudate travels, the apices and upper parts of the lungs being the parts first, and usually affected, although it might have been expected that the exudate would gravitate to the lower borders of that organ.

We have made special mention of this lung lesion, and stated the facts in a somewhat detailed manner as we have never before seen such a lesion, recorded to such an extent in any previous outbreak of Redwater.

The explanation of this exudation and general œdema or dropsy of various organs of the body, we take to be as follows. There are in the heart and liver accumulations of parasites which cause blocking of the capillary circulation. There is great destruction of the red blood corpuscles, just as in other wasting parasite diseases (distomatosis or fluke in sheep) and the blood being much thinner, and the walls of the capillary vessels badly nourished, a transudation of its watery elements results.

The initial emphysema of the lung seen in many cases may be explained by the increased amount of work which that organ is called upon to do. When seventy and eighty per cent. of the red blood corpuscles are practically useless as oxygen carriers, the respirations must be increased both in depth and frequency, to enable the remainder to carry out their important functions (particularly at this elevation of 4,000 feet above sea level.)

MICROSCOPICAL EXAMINATION OF BLOOD AND TISSUES.

In every case of the disease subjected to microscopical examination, we have been able to demonstrate in the blood and affected tissues the presence of the causal parasite of Texas Fever or Redwater, all the forms and stages recorded by observers have been seen, and one form at least (alluded to later on) which we have been unable to find any mention of.

In a blood film taken from an ordinary case of the disease, at least 70 per cent. of the red blood corpuscles are seen to be invaded by the parasite, in one stage or another (this invasion may reach 90 per cent.) The forms most commonly met with being the *bacillary*, and *spherical* type alluded to by Professor Koch in his report upon Texas Fever in Daa-es-Salem under 1897 date, in which he states :—

“With regard to the forms of the pyrosoma and the relations of both it and the full grown parasite to mild and severe Texas Fever, I have come to different conclusions from American investigators. I found, namely, in the red blood corpuscles of cases which took a severe form, and rapidly proved fatal, strange forms resembling miniature staves, so that one might take them to be small bacilli. These are frequently curved, and sometimes so strong that they form rings and in that case resemble the parasite of tropical malaria. Between such forms and the pear shaped form of the full grown pyrosoma there are a number of intermediate stages. In the severe cases they are found in extraordinary large numbers, 80 to 90 per cent. of all red corpuscles being invaded. As far as my experience goes in quite acute cases only the first forms are met with.”

Our work here completely corroborates this statement of Professor Koch, and as far as our experience goes in very acute cases the pyrosoma form of the parasite is generally absent, and the stave or bacillary form is almost invariably present.

Out of the several hundred cases in which the blood was microscopically examined, in twenty cases only was the typical double pyrosoma (alluded to by Smith and Kilbourne) met with, and then in conjunction with the bacillary, and spherical stages. The parasites appear quite as numerous in coverslips from the peripheral circulation as in smears taken from the internal organs.

Briefly the forms of the parasite met with in this epidemic may be classed as follows :—

No. 1. *The typical pyrosoma single or double*, and its modifications.—(1) The willow leaf form. (2) The clove or pin forms, and (3) the form where the head of the pyrosoma is much distended, seems vacuolated and does not take stain.

No. 2. *The bacillary or rod forms*, two or more of these may approximate themselves in such a manner as to take the form of a ring resembling one of the stages in the life history of the parasite of human malaria.

No. 3. *The coccus or spherical form*, as many as eleven of these may occupy one red blood corpuscle (the size ranging from

a pin point up to a spherical body occupying one third of the space of a red blood corpuscle, clear in the centre, and taking the stain at four points in the margin). A very common appearance seen in blood films is two spherical bodies in each red blood corpuscle.

Most of the forms or stages met with can be classed under these three heads, except the form we have alluded to before, and which resembles a *short bipolar staining bacillus*. This stage may exist in a corpuscle, alone, or in conjunction with other stages of the parasite, such as the sphere, or bacillary, is about half the diameter of a red corpuscle in length, and stains at each pole with methylene blue, for about one third of its length.

By careful focussing, it can be seen that the stained ends are slightly club shaped. That many of the rod like forms are miniature or deformed pyrosoma we are certain, as various stages in their life history can be followed out, and traced in various specimens, from quite a thin rod with the faintest possible distal thickening, through stages representing a pin or clove to the perfect pyrosoma.

We do not state that these changes can be seen in one specimen, *i.e.*, we do not infer that the perfect pyriform *must* pass through the rod form in its life history, but that these are miniature or rather deformed types of the pyrosoma bigimum. As a reason why so many imperfect or miniature forms of the organism are noticed during the present outbreak, it may be suggested that the high susceptibility of so many of the cattle brought into Rhodesia for restocking purposes may be taken to indicate that the blood of such animals is peculiarly suitable for the multiplication of the parasite. As a consequence this reproductive process goes on with such rapidity that toxic effects result before the organisms attain their full development and the parasites are somewhat altered in appearance, much as many other organisms are when grown artificially in specially favourable media.

The types of parasite met with seem to have no direct connection with the clinical symptoms of hæmoglobinuria, nor the lesion in the respiratory organs.

In the course of our investigation into this disease, we have made and examined an immense number of blood films, and are unable to confirm the statement that free parasites are very plentiful in the circulation, but we have generally found them so in the spleen, liver, and particularly the lymphatic glands, and a notable feature about the coccus form of the organism is, that when found free the coccus maintains the relative position in which they are found within the blood cells. This may indicate that they are united by a bond which does not take the ordinary stains used in Redwater diagnosis.

The brain has always yielded the causal parasite when examined, but we have not been able to find either lesions of Redwater, or parasites, in the foetus when the mother has succumbed to the disease.

Liver. Microscopical smears from this organ reveal the presence of the parasite, and the infarcts are simply areas of necrosis, full of a bacillus which yields a pure culture on artificial media.

The areas of necrosis in the liver resemble the lesion met with in cases of disseminated bacterial necrosis of that organ, and do not follow any particular course or seem restricted to any particular part of the lobule.

The bacillus exists in pure culture, and in immense numbers, occurs as short rods, motile, and forms threads, no spore formation has been noticed. Stains with ordinary aniline dyes, decolorised by Grams. Cultivation is *Aerobic* and *Anærobic*.

On Agar Agar, a thick grey growth.

In Bouillon, forms a cloud and renders media turbid.

In Milk, coagulates media.

In Gelatine stab, grows along needle tract.

From above tests we imagine the bacillus to be *B. coli communis*, a common inhabitant of the intestinal tract, and often found associated with diseased conditions in affections of the liver, when the vitality of that organ is diminished. As it is not possible to carry out complete bacteriological investigation in a field laboratory, this organism will be further investigated in the Veterinary Bacteriological Laboratory, Cape Town.

Kidney. Smears from this organ show the parasite present in the red blood corpuscles, generally in a spherical form, and it is common to find a number of affected corpuscles bound together (blood casts).

Sections shew the infarcts to be germ free, and simply to consist of areas of non bacterial necrosis, the glomeruli are the chief centres affected, there is much proliferation of the cells lining the tubule which contain casts, and in some cases there is a small celled infiltration invading the infarcted spots.

In section from an acute case where there are no infarcts, blood casts are met with in the tubules, and an acute hæmorrhagic condition of the whole organ is frequently present.

Spleen. Smears from this organ show the parasite in all its various forms, free and in the corpuscles. Section shows an immense congestion of the organ, and a number of degenerated blood cells.

Lung. Smears shew parasites if blood corpuscles are present. On section, there is distension of the air sacs with a fibrinous exudate, and a slight small celled infiltration of their walls. Section of the lung much resembles that organ, in horse sickness.

Spinal Cord. On section, the vessels are noticed to be filled with red blood corpuscles, containing the characteristic and causal parasite.

METHODS OF STAINING.

In microscopical examination of the film from the blood and smears from the organs of affected animals, the customary methods in regard to fixing and staining were employed. The films were air dried, fixed by immersion for two minutes in equal parts absolute alcohol and

æther, dried, stained with Eosin (5 per cent. in 75 per cent. alcohol). washed, counterstained in a watery solution Methylene blue for 15 minutes, dried and mounted.

When a quick diagnosis was required, Leoeffers Methylene blue was employed. A weak solution of Gentian violet stains the organisms well, but such preparations fade with great rapidity.

In the case of sections, Eosin, and counterstaining with Methylene blue gave good results. Coles stain (Eosin and Hæmatoxylin) gave very indifferent results.

TREATMENT.

At the beginning of the present epidemic medicinal treatment in not a few cases gave encouraging results, the prescription recommended by Dr. Hutcheon being extensively tried and favourably reported upon in some quarters.

Calomel	...	...	...	1 drachm.
Carbolic Acid	...	...	...	1 drachm.
Quinine	...	...	...	2 drachms.
Raw Linseed Oil	...	...	...	1 pint.

This is a first dose. Mix well and administer with care, the last three ingredients only to be repeated every twelve hours as long as necessary. If this treatment is to have any value, it must be commenced as soon as the animal appears sick. This drench, was employed with good results in the Melsetter District at the commencement of the present Redwater outbreak, but as the disease assumed a severe form, proved of no value, and we think, from what we have seen, that when certain remedies prove of value during the present epidemic, the success is due more to the fact that the drenched cattle have had a mild dose of infection, than to any very great efficacy in the drenching material. Liberal intra muscular doses of acid hydrobromate of quinine in some cases seemed to answer fairly well, intravenous injections of Baccelli's mercuric chloride solution were tried, and combinations of various other drugs, but as the veld infection increased medicines proved utterly unavailing.

INOCULATION.

Inoculation against Redwater, which has been practised in many localities with conspicuous success, has not so far given satisfaction here, on account of the intensity of type which the disease has assumed, and a somewhat parallel condition exists in Natal, where it is not found possible to protect imported stock coming from localities where the disease does not exist. If such imported animals are inoculated with immune blood in the ordinary way, they generally develop a virulent type of the disease and die, so virulent is the blood of immune native born stock in the coast districts of Natal.

Preventive inoculation against Redwater is carried out by inoculating susceptible stock with a dose of from three to five cubic

centimetres of freshly drawn blood taken from an animal immune to the disease, with a view to producing a mild attack of Redwater, sufficient to protect such stock subsequently when exposed to veld infection. This blood may be drawn from:—

1st.—An animal born on Redwater infected veld and which has run there all its life.

2nd.—An animal which has had an attack of Redwater at least three months previous to withdrawal of blood, and since run on infected veld.

3rd.—An animal which has had a dose of Redwater blood from a recently salted Redwater animal, and which, after inoculation has had a severe rise of temperature in consequence.

In the Colony the first is preferred, and here we consider the last will be the most suitable; but it must be borne in mind that the blood of a salted animal can, under certain conditions, kill clean susceptible stock, and in order to discover whether a certain natural or artificially rendered immune animal is a fit and proper subject from which to draw blood it is necessary to test such blood by inoculating one or two clean animals before doing all the herd.

The varied virulence of the blood of a salted animal is probably directly proportionate to the extent to which it is infested with Redwater ticks, and as those increase in number, the blood, though at all times capable of infecting, may produce a fatal or severe attack in animals inoculated therewith.

METHODS OF INOCULATION AS PRACTICED IN AUSTRALIA AND AMERICA.

NEW SOUTH WALES METHOD.

In New South Wales, inoculation against Redwater is becoming necessary, as the disease is now encroaching upon that Territory from Queensland.

In his appendix to Dr. Tidswell's report, of December 28th, 1898, Mr. J. Douglas Stewart, M.R.V.C.S., recommends that protective inoculation be carried out on the following lines:—

1st.—Establishment of salted stock whose blood is to be used for protective inoculation. Healthy young cattle are best adapted for this purpose as they are easier handled and operated on. Moreover, they are naturally less susceptible to the virulence of the fever and are constitutionally healthier than adults. In order to thoroughly "salt" these stock it is recommended they receive three inoculations as follows, viz.:—

(a) A first inoculation of five c.c. recovered blood. This should produce a reaction within four to twelve days, after which a period of four or eight weeks is allowed to elapse for completer recovery to take place, when they are subjected to

(b) A second inoculation of ten c.c. of recovered blood. This inoculation is not considered indispensable in cases where

the temperature records of animals taken after the first inoculation indicate that a severe reaction has taken place. It is, however, recommended to be practiced when large numbers are operated on at one time. After this inoculation the cattle are kept under observation for fourteen days, and if no reaction follows

(c) A final inoculation of ten c.c. virulent blood, the strength of which should be demonstrated by inoculating an unprotected beast.

Should the final inoculation of proved virulent blood fail to produce a reaction, and in no way inconvenience the animals so treated, the blood of these animals may be regarded as well adapted for the purpose of conferring immunity to others by inoculation. In recommending this process the object is to produce an immunity of high degree and lasting influence.

CONDITIONS TO BE OBSERVED WITH REGARD TO INOCULATION.

Experience has taught that in order to minimise the loss resulting from inoculation the following conditions must be observed, viz. :—

1. The cattle must not be travelled long distances either before or after inoculation.
2. That cattle in moderate condition withstand the effects of inoculation better than those in prime or low condition.
3. The operation must be conducted with as little noise and bustle as practicable.
4. The cattle under treatment must be placed in paddocks containing a good supply of grass and water and there allowed to remain undisturbed.

RE-INOCULATION RECOMMENDED.

Experience has taught that when inoculating large herds a certain small percentage do not re-act, consequently it is recommended that all cattle treated should be subjected to a second inoculation within four to eight weeks time from the first. In this manner it is hoped to bring about a re-action in those that had previously escaped, and it is only with such animals that extra risk is involved. The second inoculation will not affect those that re-acted to the first, while a greater degree of protection may be conferred. The security offered by such procedure adequately repays the trouble involved.

AFTER TREATMENT.

It is necessary to place the cattle immediately after inoculation in paddocks containing a good supply of grass and water, under care of a reliable man, where they should be left undisturbed. It is not advisable to remove or work them until after the expiration of *six weeks after inoculation*.



FIG. III.—NATAL OX DEAD, BEDWATER, SHEWING PROTII AT NOSTRILS.

2 (Published by permission of B.S.A.Co.)

QUEENSLAND METHOD.

Inoculation in Queensland is conducted on similar lines to those adopted in New South Wales, the subcutaneously injected blood being taken from immunised calves. The dose is generally five cubic centimetres, care being taken to protect inoculated stock from gross tick infection, for some considerable time after inoculation, by the use of dips. Stress is laid on the difficulty experienced in immunising bulls, which are more highly susceptible than other stock, particularly if over two years of age, and upon the inadvisability of inoculating cows heavy in calf. Although the mortality resulting from inoculation is generally low, generally from three to five per cent., sometimes, for unexplained reasons, it rises to twenty-five per cent.

TEXAN METHOD.

With regard to inoculation against Redwater as practiced in the Southern States of America, W. H. Dalrymple, M.R.C.V.S., of the Agricultural Experiment Station, Baton Rouge, Louisiana, has kindly communicated the result of his latest investigations supplementing the summary of the most effective method of immunisation, issued by the Director of the Baton Rouge Station in 1899.

The summary states: "Immunity against a fatal attack of Texas Fever can be conferred on susceptible cattle by inoculation with the blood from a native Southern, or one which has recently been rendered immune. When used, in five cubic centimetres doses, blood from a recently immune animal gave a less virulent and less protracted form of the artificially produced form than a similar amount from a native. Two and one half cubic centimetres of blood from a recently immunised animal acted satisfactorily on two imported Hereford (bull and heifer) calves, aged respectively eight months and five months.

"Two cubic centimetres of the same blood injected into a one month old calf gave satisfactory results.

"Animals that had been allowed sufficient time to perfectly recover from inoculation fever before being exposed on a tick infected pasture, suffered no apparent ill effects from ticks. Animals exposed to ticks before convalescence was complete, suffered a temporary relapse."

To this, Mr. Dalrymple adds in a letter, dated April 3rd, 1902:—

"Since the publication of our immunisation work we have adopted as a standard dose, 1 c.c. of defibrinated blood, and find it answers all purposes, and besides we have been adopting a second inoculation with about one and one half to two cubic centimetres after the second fever period (from the first inoculation) has been recovered from. This seems to increase the immunity and when animals are exposed to tick infection they do not suffer so much. With only one inoculation I have found cattle to have a considerable rise of temperature after being infested with ticks."

The following are the steps in the actual procedure of drawing off salted blood and inoculation, described by Mr. Dalrymple.

The animal from which blood is to be drawn is secured either by casting and tying, or by placing in stocks or traxis. The hair is then clipped or shaved closely for three or four inches over the jugular vein, about half way up the neck. The part is then thoroughly disinfected by saturation with a 5 per cent. aqueous solution of pure carbolic acid or creolin. A piece of small rope (about one quarter inch) is tied tightly around the base of the neck, so as to raise the vein by checking the flow of blood in it. The instruments and other requisites used are a small trocar and canula, a hypodermic syringe and needle, a small glass vessel, a small sharp pointed lancet or knife, a 5 per cent. aqueous solution of pure carbolic acid or creolin, and some boiled water. Before being used, all instruments, etc., should be thoroughly disinfected or rendered sterile with the antiseptic solution, and the vessel, trocar and canula, and syringe and needle should be rinsed out with the boiled water. When everything is in readiness a small incision is made through the disinfected skin, over the jugular vein with the lancet. The trocar and canula is then inserted through the incision into the vein and directed upwards toward the head. The trocar is now withdrawn and the blood allowed to escape through the canula into the glass vessel. When sufficient has been obtained the canula is withdrawn and the rope loosed from the neck when the flow of blood will cease.

The blood in the vessel is then stirred slowly with a thin glass rod, which has also been sterilized until all of the fibrin collects on it and is withdrawn; it is then taken up into the syringe and is ready for use.

The animal to be inoculated is prepared by clipping the hair off a portion of skin about the size of the hand, behind the shoulder blade, about half way up the chest, and is disinfected as in the previous case. The skin is then drawn out between the thumb and forefinger, and an incision made through it with the lancet to allow easy access of the hypodermic needle. The syringe is now attached to the needle and the quantity of blood injected underneath the skin. There will most likely be a small enlargement due to the blood collecting in a little sac. To hasten absorption it is well to pass the hand over the part a time or two to scatter the fluid.

RHODESIAN INOCULATION EXPERIMENTS.

On January 6th, before the disease had excited much comment in Salisbury, steps were taken on a small scale to prepare for protective inoculation in the expectation that when the rains ceased and winter came on, tick infection would then be diminished to an extent which would render inoculation practicable.

For this end, and with a view to ascertaining whether immunity could be produced by inoculation with the blood taken from the three Australian cows which had survived the disease at Umtali the

previous season, three calves were inoculated with blood drawn from the jugular of one of these animals, each calf receiving 5 c.c. respectively. Although these three animals manifested no external evidence of constitutional disturbance, they experienced a temperature re-action which may be considered characteristic of Redwater, their temperatures tending in an upward direction about the seventh day, reaching a maximum about the twelfth, becoming normal about the seventeenth, to rise again on the twenty first, beginning to subside for a second time about the twenty-fifth day.

After being under observation for over forty days and continuing in good health, with a view to testing their immunity one of them received an injection of 10 c.c. subcutaneously and another 2 c.c. intravenously of virulent blood taken from an animal at the height of the disease, and which displayed on subsequent post mortem the peculiar œdema and emphysema of the lungs to which reference has already been made, and at the same time a healthy unprotected calf was inoculated as a control with 2 c.c. of the same blood given intravenously. While the immunised stock re-acted, their temperature records displaying the same peculiarities noted upon their first inoculation with recovered blood, the re-action was not so marked as that of the control, which, however, shewed no external symptoms of illness in spite of his high temperature. When it was found that no ill effect resulted from a primary inoculation of virulent blood, with a view to hastening the process of calf immunisation, as the winter was approaching when we hoped to begin general inoculation, a series of calves were inoculated with doses of virulent blood varying from 2 to 25 c.c., and none of these calves succumbed, nor were any notable signs of indisposition displayed by any of them, as they were kept in a kraal to protect them from ticks, and stall fed; although all gave a characteristic re-action, while calves in infected herds, exposed to natural infection, in many cases died off with almost the same rapidity as adult cattle.

About this time experimental inoculation with glycerinated bile injected subcutaneously and intravenously, in doses varying from 20 to 60 c.c. taken from animals dying of the disease, preserved by adding two parts of bile to one of glycerine, was tried extensively in the Umtali and Penhalonga Districts, and at first the result appeared so satisfactory that public confidence in the method seemed warranted. In herds in which the disease had appeared and which were subjected to bile inoculation, the disease ceased for four or five weeks, such herds, while kept under close observation remained healthy and were pointed out by their owners as evidence that bile inoculation had come to stay. Unfortunately, however, as subsequent developments shewed, the apparent arrest of the disease in these cases, was not due to the protective influence of glycerinated bile, but merely to the fact that the supply of pathogenic ticks having been exhausted by the cattle which succumbed at the first outbreak, a considerable interval varying with climatic conditions had to elapse before the progeny of the first brood of disease-producing

ticks were hatched out and took part in the dissemination of the

That this is the true explanation of the phenomenon observed in the case of bile inoculated herds there is no reason to doubt, as the disease exhibited similar characteristics in herds on the margin of the invaded area which were not inoculated in any way, and both in bile inoculated herds and uninoculated herds the disease subsequently re-appeared and finally cleaned them out.

Returning to the account of the work conducted in Salisbury while the series of calves were re-acting to the inoculation with virulent blood, which has been referred to, the disease extended with great rapidity in the Salisbury District, its extension being facilitated by the movements of hitherto uninfected cattle which were taken through the highly infected commonage on their journey to and between the town and the comparatively clean farms outside.

The state of affairs being serious, it was decided to put protective inoculation to the test on a more extensive scale amongst adult cattle belonging to the Government, as a preliminary to carrying out the work still more widely if the results justified it, although the conditions were the reverse of favourable, as with the exception of two days of severe frost in June, the weather remained abnormally mild and larval ticks were abundant. The dose of recovered blood injected subcutaneously in each case was from 3 to 5 c.c. kept fluid by the addition of 10 c.c. of a 5 per cent solution of citrate of potash to every 100 c.c. of blood. The result of inoculation within the infected area cannot be considered to have been satisfactory, as it was found practically impossible to keep stock free from ticks while undergoing the inoculation fever, and thereby protecting them from the possibility of further infection by pathogenic ticks, consequently a large proportion of the animals succumbed to the combined effect of artificial inoculation with recovered blood and natural infection by disease-bearing ticks. Without the highly infected area, more hopeful results were obtained, but even here it was found that the blood of our immunised animals having become intensified through these cattle becoming infested with virulent ticks which were now abundant in the kraals in which they were housed, either induced such a violent re-action that fatal results followed inoculation, or the immunity which was conferred by the inoculation afforded little protection when those resisting the inoculation were brought into thoroughly infected areas after an interval of 30 days, the interval of repose recommended in Queensland after inoculation, and even when kept outside these areas on comparatively clean ground, they gradually succumbed to secondary infection communicated by the pathogenic larval ticks hatched out from those parasites which had matured upon their neighbours that had died from inoculation. This being the case and the numbers of larval ticks being on the increase with the onset of milder weather, further progress with inoculation against disease of such abnormal virulence as is displayed during this outbreak, was out of the question, until some arrange-

ments can be made to protect already immunised stock, which are now beginning to break down under constant tick infection, from further attacks, and also to protect inoculated cattle from tick infection while undergoing immunisation, if such a process be at all possible at this present stage of the epidemic, which in virulence seems unique. So deadly is it, that the mortality amongst calves which generally resist redwater infection, has been extreme, animals only a few weeks old developing the disease, while Madagascar cattle, which are usually highly resistant, also die, and the seven cattle sent up here by the Natal Government to see whether animals immune to coast infection would withstand the disease, only lived three weeks. Furthermore the few animals which have recovered from a first attack in many instances developed a second attack about three months later which terminated fatally. Hence it is apparent that if a severe natural attack only confers immunity for a comparatively short space of time, there is but little likelihood of animals being effectually protected by the mild attack which is induced by inoculation, unless they can be guarded against gross tick infection.

The severity of the present outbreak may be due to any one, or to a combination of the undermentioned causes:—

First.—It may arise from infection with abnormal numbers of pathogenic ticks.

Second.—The disease may have become intensified by its passage through a large number of highly susceptible animals.

Third.—It may be due to climatic influences and may persist as a constant characteristic of Rhodesian Redwater.

Of these three causes we are inclined to ascribe the present virulence of Rhodesian Redwater to the second in the main, although it may be somewhat influenced by the first, but this is a point which will be more easily settled when the dipping tanks, now in progress of construction in various stock raising centres, are ready.

DIPPING TANKS.

These tanks are modelled upon the plan of those erected at the Santa Gertrude Rancho, Texas, with certain modifications adopted from the plans of dipping tanks published in the Natal Agricultural Journal, in order to enable warm arsenical dips to be used.

Plans of the tanks are attached, with copy of instructions *re* dipping and when these tanks are started the maintenance of cordons and quarantines will be abandoned, and cattle will be allowed to move freely without let or hindrance so long as they are dipped regularly every three weeks.

The Queensland view on the value of dipping as a preventive of Redwater is expressed in a letter recently received from the Chief Inspector of Stock, Queensland, who states that as a result of their more extended experience they now attach even more importance to dipping than they do to inoculation for the protection of stock from tick fever.

With the inauguration of the dipping process it is proposed to carry out further inoculation experiments in three directions.

First.—An attempt will be made to reduce the virulence of our native born immunised stock by keeping them tick free, in the hope that by so doing we may be able to use their blood safely for inoculation with reasonable hope of satisfactory results, if inoculated stock are subsequently protected from gross tick infection while undergoing immunisation and subsequent to recovery therefrom.

Second.—A certain number of cattle salted to Colonial Redwater will be brought up and used for inoculation purposes while they are kept clean by dipping in the hope that the modified protection against Redwater which will be conferred by their blood, may suffice to protect animals which are dipped against the more severe form of the disease prevalent here.

Third.—An experiment of a similar character to number two will be made with immune stock from Texas. It is hoped that in one of these directions we may find a way out of our present difficulty.

VALUE OF CORDONS AND QUARANTINES.

As this disease is not infectious in the ordinary acceptance of the term, the chief, if not only medium of infection being the cattle tick, and as ticks which have fed upon recovered animals are infective, restrictions as to stopping of road traffic, to be any good, must be absolute and permanent. You must quarantine against the ticks and the disease will not appear, and as this is practically impossible, it would be an excellent plan if dipping were made compulsory as far as riding transport on the roads were concerned, until such time as the majority of the farm stock were protected by inoculation.

THE DIPPING MIXTURE.

6 lbs. Arsenic.
24 lbs. Soap (common yellow).
24 lbs. Washing Soda Crystals.
5 galls. Stockholm Archangel Tar.
400 galls. Water.

The dip must be boiled for six hours to ensure chemical mixture. For heating purposes, two 400 gallon tanks are used here. Fill only 300 gallons into each tank, and add 100 gallons to each tank after dip has been boiling for $5\frac{1}{2}$ hours. If the tanks are filled to start with, the dip will boil over, causing considerable wastage.

It is essential that the whole of the dip should be boiled, *i.e.*, it will not do to put all the ingredients into, say, one 400 gallon tank, and then dilute this with water. This was tried in Australia, and was not successful. It takes about 3,500 gallons to fill the tank.

The dip should be used at about a temperature of 100 degrees, the dipping tanks should be covered, and arrangements made so that no water can get into it. The dip can be used over and over again,

fresh dip being added to make up the quantity removed by cattle which is, roughly, rather less than a gallon per beast.

Cattle grossly infected with ticks may feel the effects of first dipping rather severely, and a favourable day should be chosen to dip, the reason being the cattle are so raw from tick infection, and the arsenic, etc., is taken into the system to a certain degree, and the nipping sensation of the dip will make them feel seedy for a day or two.

It will be found that milk cows will go off their milk for a day or two, but after that the milk flow will exceed the quantity prior to dipping. The ticks will not fall off until four or five days after the dipping, the result being apparently disappointing on the day following dipping, as ticks seem to be as numerous as ever, but, on examination, they will be found to be dying or dead, and will relax their hold on the animals about the fourth or fifth day.

Cows heavy in calf and young calves may be dipped with impunity, also thin cattle. In dipping calves, however, it is advisable to put a headstall on the calf, and, after the first plunge, keep the head out of the water, otherwise they may sink two or three times, and swallow too much of the dip.

SUMMARY.

Having stated in short language the History, Clinical Symptoms *Post-mortem* Lesions of the disease, Microscopical Examination of affected tissues and drawing attention to the conditions where the organism appears to differ from the description usually given by observers and detail the result of protective inoculation, it is as well to state how in our opinion this epidemic of Redwater differs from that disease as known to us in the Cape Colony and from the description of the workers in other countries in :

1. The severity of the infection and mortality amongst infected herds.
2. The fact that young animals (sucklings) bred and run on infected veld contract the disease and die.
3. The fact that one attack (and sometimes a second or third) of the disease does not confer any lengthy immunity.
4. The severity of the *post-mortem* lesions.
5. The presence of lung lesions in 30 per cent. and of kidney and lung lesions (infarcts) in the greater proportion of cases.
6. The uncertainty of conferring immunity upon clean stock by the methods of inoculation as practiced in Cape Colony and America.

From the experience gained during our work with the disease in Rhodesia and the perusal of the literature upon the subject by workers with Texas Fever in other countries, we are inclined to the belief in this case, that the disease has behaved as it always does when invading a fresh area, and as it did on the first invasion of the

Cape Colony, Queensland, and many parts of America, *i.e.* assumed the form of a severe epidemic and has developed a virulence which will probably abate at a later stage.

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THE FERMENTATION OF WINE.

Regulating the Temperature.

A most interesting and instructive paper was read at the last annual meeting of the South Australian Vignerons' Association by Professor Perkins, who dealt with the subject of the regulation of the temperature in the fermenting vats during wine-making. The *Australian Vignerons* publishes the paper in full as follows:—

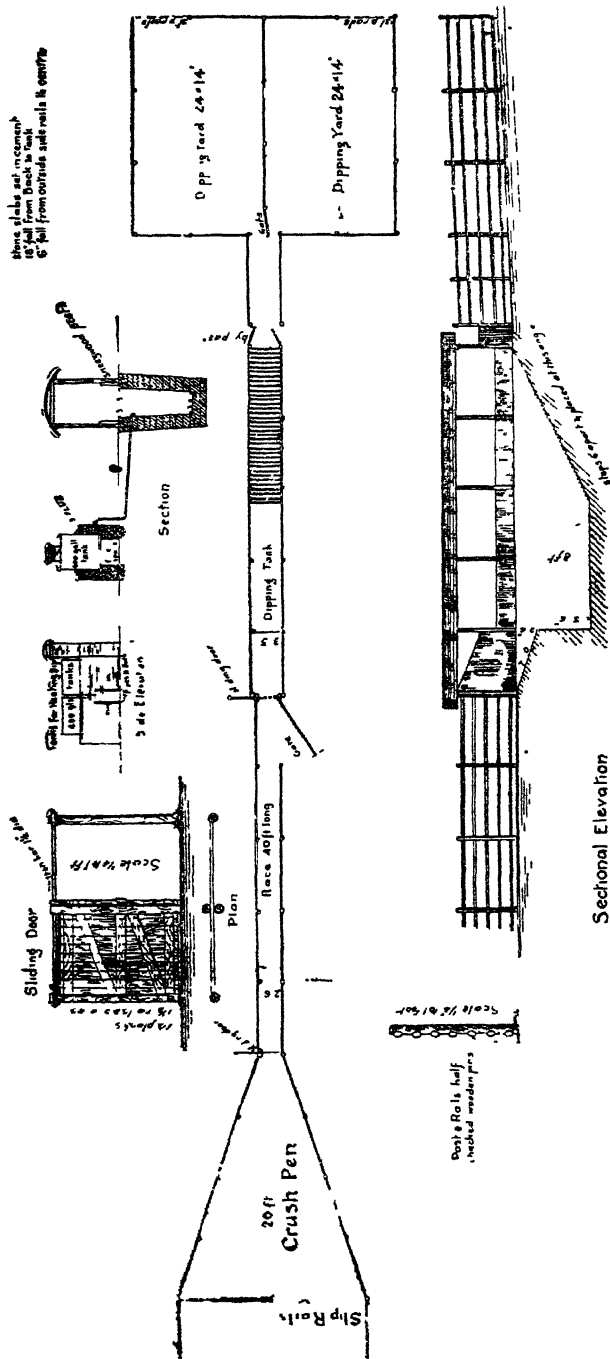
My main object to-day (said the Professor) is to draw attention to a simple method of keeping in check the rise in temperature of fermenting vats. My own observations go to prove its perfect efficiency, even in presence of the most unfavourable conditions. I would, however, preface any reference to it by a brief examination of two points not unconnected with it: 1. The efficiency of the centre pumps attached to the false heads commonly in use in our cellars. 2. The efficiency of the surface coolers now very generally adopted here. These two questions are to a certain extent materially dependent one on the other, because under our present practice on the efficiency of the centre pump a large measure of the efficiency of the surface coolers depends. I think that we may summarise the work that the centre pumps are called upon to accomplish in the following manner:—(1) To produce evenness in the fermenting mass by thoroughly mixing up the different parts of the liquid; (2) to bring about uniformity of temperature throughout the vat; (3) to extract the maximum of colouring and extractive matters from the skins, by causing the juice to repeatedly pass through them; (4) to aerate the fermenting must when such aeration becomes necessary.

My observations lead me to believe that, excepting in the last case—that of aeration—the work done by these pumps is exceedingly unsatisfactory. So convinced have I become of these facts that,



FIG. IV.—GROUP OF SICK CATTLE

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CATTLE DIPPING PLANT AT NEL'S RUST, NATAL.

although these centre pumps are fixed to all the false heads in the Roseworthy cellars, I now make no further use of them. I think that it would be of interest during forthcoming vintages to ascertain whether others can confirm my views on the subject or not. Of course, I recognise the great simplicity of manipulation of these pumps. It was this advantage that at first attracted me to them. I have come to the conclusion, however, that it does not make up for their other defects, and I at present much prefer the more laborious, but in my opinion eminently effective, method of running out the liquid from the bottom of the vats and pumping it back over the skins. Let me now explain on what are based my objections to these centre pumps, the only recommendation of which appears to me to be their extreme simplicity. Everybody is, I presume, familiar with the extreme compactness of the cap whilst the must is in fermentation and the gas struggling to escape. In this condition it offers a considerable amount of resistance to the percolation of liquid, and my observations lead me to believe that the momentary vacuum produced with every upward stroke of the pump is only felt within the immediate neighbourhood of the centre pump. From this results the formation of what we may term the suction area of the pump, representing around it a circle not exceeding 2ft. in diameter. Through the skins below the area the liquid gradually works channels, and keeps passing through it over and over again, whilst the mass of the skins remains untouched.

That such is the case can readily be proved, and an account of the facts that definitely confirmed views that had long been simmering in my mind will open the door to those who may be anxious to carry conviction to their minds by actual experiment. I happened to be in the Coonawarra cellars during the opening of the 1901 vintage. As is frequently the case in this district, the weather was cold, and fermentation hung fire. I advised the manager (Mr. E. F. McBain) to run steam through his surface coolers, and mix up the must by working the centre pumps. Whilst the first vat was being treated in this manner we watched the progress of the rise in temperature in the skins by means of a long stem thermometer. As soon as the surface temperature reached 100 degrees F. the centre pump was set going. If my memory serves me right, it was worked for nearly an hour. At this stage, although the temperature of the free liquid above and below the false head, and of that portion of the skins within what I have termed the suction area of the pump, was approximately 80 degree F. the temperature of the skins beyond the suction area still remained below 60 degree F., which was the initial temperature of the vat. These facts, to my mind, clearly demonstrate that the same liquid was being acted upon over and over again by the pump; that this liquid was only a fraction of the total quantity present in the vat; and that, moreover, it only passed through a very limited quantity of skins, placed in the immediate neighbourhood of the pump. I subsequently advised Mr. McBain not to use the centre pump for the next vat, but draw off from the

bottom outlet, and pump over the skins. In this vat the results were most satisfactory, a uniform rise in temperature being noticeable throughout the skins. And further, although in both vats the grapes were of the same variety—Shiraz, I believe—in the second one the juice, though not in fermentation, rapidly assumed a fine red colour, whereas the first one retained practically its original colour. This last feature tends to confirm the view that in the first vat, when the centre pump was in use, the heated juice had only passed through a limited amount of skins, and in consequence had not been able to dissolve much colouring matter.

From the above experiments I judged that the following propositions, unless otherwise disproved, must be allowed:—1. That the centre pump is not a suitable contrivance for establishing uniformity of temperature and fermentation throughout the vat. 2. That when the centre pump is used regularly throughout fermentation, to the exclusion of drawing off from the bottom and pumping over the skins, a large amount of colouring matter which might otherwise have been taken up remains untouched. This latter point is not of much importance, when grapes naturally deeply coloured, such as Shiraz, are fermented, but this is not the case with others that are less favoured, such as Mataro. I am convinced that with the latter we should obtain a far more deeply coloured wine, and consequently a more full-bodied wine, if we set aside the pumps altogether, and throughout the course of fermentation, twice every day and for the space of an hour at a time, we drew off the liquid from the bottom and pumped it over the skins. In small cellars the pumps would have to be worked by hand, but in large ones there is no reason why the pumps should not be connected with the main shafting that drives the elevators and crushers, and thus worked automatically.

I have already recognised that these centre pumps facilitate the aeration of the must. So far as the liquid acted upon by them is concerned, this is true enough, but what of the bulk that remains imprisoned in the skins and often needs it most, and from what we have already seen remains practically untouched? And, moreover, this aeration is a thing that can readily be abused. This is a subject upon which I cannot at present enter into details, but I think that it is now admitted by all that all the aeration that is necessary should, as much as possible, be given to the must before the start of fermentation, but that subsequently the must should only be aerated when circumstances render it absolutely necessary. Now, if you rely exclusively on your centre pumps for stirring up your must, every stroke of the pump causes the absorption of a more or less considerable quantity of oxygen. There is, therefore, danger of over-aeration. If, on the contrary, you pump over your must from the bottom outlet, this can easily be avoided by fitting on to the bottom outlet a short bit of hose that is kept well plunged into the outflowing liquid, and by keeping the delivery hose of the pump well immersed within the free surface liquid.

Now as to these surface coolers. It would be useless for me to deny them some measure of usefulness. It is quite evident that a stream of water, however small, entering a vat at a low temperature and issuing from it at the same temperature as the vat, must relieve the latter of some portion of heat. Further, the success of the vintages of the last few years is in many cellars attributed mainly to their aid. I am afraid, however, that other factors as well have latterly joined hands to make our vintages a success, and that should they, as is possible, desert us, we shall be exposed to rude awakening did we place unlimited confidence in these surface coolers. For instance, it must be recognised that during the last four or five years we have generally been favoured with exceptionally good vintage weather, but this can hardly be expected to continue indefinitely. Nor, again, have we been making wines quite as full as in those years when sweet acid wines occasionally almost equalled the bulk of sound wines. The cry from London, however, is one for stronger and stronger wines, and it seems likely, at least for some years to come, we shall be called upon to make wines of even fuller type than those we have hitherto made. It is then that these surface coolers must stand their trial, especially if unfavourable weather conditions should be more common than has latterly been the case.

Before examining the somewhat debatable question of the general efficiency of these surface coolers, it may be pointed out as a consequence of what has already been said that much of what efficiency they may possess disappears if they are used conjointly with a centre pump. The skins are pre-eminently bad conductors of heat, and therefore show little tendency to lose heat when in contact with slightly cooler liquid. I have often had occasion to watch this phenomenon. In one instance I recollect that in one spot of a vat the temperature of the skins for some unknown reason was 85 deg. F., whereas within a foot of this spot and throughout the rest of the skins the temperature was only 60 deg. F. This difference of 25 degrees was still observable 12 hours after the first observation. In fact, at no time is it even possible to register quite uniform temperatures throughout the body of the skins. Here it may be pointed out that it is the exclusive use of an ordinary size thermometer that has deluded many into the belief that surface coolers were maintaining a uniformly low temperature throughout their vats. Dr. Angove was the first to draw my attention to this fact, and, following his example, I purchased a thermometer with a stem 3 ft. long, and wherever I have used it I have found temperatures far above those a short thermometer would ever lead one to suspect. In fact, in one cellar, I was challenged to show that in any tank in which surface coolers and centre pumps were regularly used temperatures above 85 deg. F., could be registered. By the aid of my long thermometer, I was able to prove it on the first tank examined. I asked my challenger first to take the temperature in the ordinary way. This he found to be below 85. I then plunged the long thermometer in the skins, and the mercury soon rose above 100 deg. F.

From such considerations I am led to infer that the efficiency of surface coolers would be raised if centre pumps were discarded, and the liquid pumped over from time to time after drawing it out from the bottom outlet. Personally, however, I very much doubt whether even under the most favourable conditions these surface coolers will prove really efficient with very dense musts and unfavourable weather. My scepticism arises out of a calculation of the rate of flow of water necessary to secure perfect results. I may summarise the matter as follows :—

Let us assume that we have at our disposal water that can be brought to the tanks at a temperature of 65 deg. F.; and in summer I very much doubt whether lower temperatures can be secured. Can this water, by circulating through the surface coolers generally in use, keep a must at 80 deg. F., which would otherwise, weather favouring, reach 100 deg. F. in 12 hours, if not less? This means that the amount of heat generated during this time would, after deduction of losses by radiation and other sources, be equivalent to a rise in temperature of 20 deg. F., distributed over the whole mass of matter in the fermenting vat. We cannot for an instant suppose that it is the liquid alone that we have to cool; the skins contain just as much heat, and, what is more, retain it far more tenaciously. Putting the case in the most favourable light possible, we may assume that every pound of water circulating through the coolers takes away a given quantity of heat from a pound of the heated matter in the vat. Assuming that the water which enters at 65 deg. issues from the coolers at 80 deg. F., the temperature at which it is sought to maintain the vat, the amount of heat removed by every pound of water may be looked upon as equivalent to a rise in temperature of 15 deg. F. If we further suppose that the vat to be cooled contains 5 tons of fermenting matter, corresponding only to 650 gallons of wine, the amount of heat gained by this mass during the 12 hours would be represented by $2240 \times 5 \times 20 = 224,000$ deg. F. This sum, divided by 15, the number of degrees that each pound of water is supposed to gain, would give the number of pounds of water that would have to circulate through these coolers during the 12 hours—14,933 lb. of water, or 1493 gallons. This would represent a flow of 2 gallons a minute for a relatively small tank. Such a rate of flow is never obtained in ordinary coolers, and were it obtained the surface of contact would have to be considerably increased before the water could have time to be sufficiently heated to issue at 80 deg. F. Further, the amount of water required for cooling purposes would be enormous under such circumstances; a 100,000 gallon vintage would call for from one to two million gallons of water! It is on such grounds that rest my doubts as to the efficacy of these surface coolers in troublous times. I trust that in those cellars in which faith is still placed in them the matter will be thoroughly investigated during coming vintages. But, apart from such considerations, even if the action of these surface coolers were irreproachable, there exist many cellars in which large quantities of

water at a suitable temperature is not obtainable. It is to such cellars, I imagine, that the cooler to which I am about to refer may prove of interest. It is now four or five years that I have been endeavouring to solve the difficulty of checking the rise in temperature of vats in cellars ill-provided with cool water. During this period I have had occasion to try and test various forms of simple coolers, and have finally come to the conclusion that the simplest and most efficient is the one recommended by an old fellow-student of mine, Mr. A. P. Hayne, in charge of the Californian Viticultural Station. I had exceptional opportunities of testing its value during the past vintage, having both extremely dense musts and occasionally very unfavourable weather; and, in spite of the crudeness of the model upon which I had to work, results obtained were of a most satisfactory character. In principle the cooler consists of a double set of copper pipes, superposed one above the other in a vertical plane, through which the must circulates; on to these pipes is blown, by means of a centrifugal air fan, water issuing in an extremely fine state of division from a battery of ordinary spray nozzles. In Mr. Hayne's apparatus the whole is enclosed within canvas sleeves. I found, however, that better results were obtainable when the apparatus was enclosed in a box made of sheet iron. The pipes are short, 3 to 4 ft. in length, and $5\frac{1}{2}$ in. \times $1\frac{1}{2}$ in. in breadth and depth; they fit into a common metal head, closed by a single plate with a sheet of rubber as washer. In order to avoid loss of spray and consequently of cooling power, the pipes are placed 1 inch apart, and inclined at an angle of 3 deg., opposing pipes of either column forming an inverted V. As I have already said, the cooler I used during the past vintage was very far from perfect in construction; nevertheless, it gave results that were exceedingly satisfactory, and which I hope will be improved upon during the coming vintage. The fact that I was able to run out dry a Shiraz must testing about 1.120 density, with strong north winds and the temperature in the shade for several days in succession about 100 deg. F., is, I think, a sufficient proof of its efficiency. Without the aid of the cooler I feel certain the wine would have been lost. This cooler is comparatively inexpensive, and involves the use of but little water, part of it being used over and over again; it further presents the advantage of working at its best when the atmosphere is at its driest and hottest. It should therefore commend itself to our smaller cellars. The pumping of the must may be done by hand or by connection with the shafting driving the crushers. I am prepared at any time to give details relating to its construction.

VINE-CULTURE IN NORTH AFRICA.

The reports of the Austrian Consulate in Algiers contains information in reference to the vine-industry of that country which are here-with reproduced as they are of general interest. Vine-culture in Algiers is of a more recent introduction but in spite of this the development was rapid, being favoured by the destruction of French vineyards by *Phylloxera* as can be seen from the following records.

	Area under Vines.	Quantity Pro- duced in Hectolitres.	Hectolitres Ex- ported.
1875	16,044 hectar*	196,000	5,000
1880	23,727 "	433,000	19,000
1885	70,886 "	968,000	326,000
1890	110,042 "	2,331,000	1,965,000
1895	122,186 "	4,132,000	2,946,000
1896	119,730 "	4,502,000	3,232,000
1897	125,768 "	4,381,000	3,810,000
1898	143,935 "	5,550,000	3,420,000
1899	139,026 "	4,502,000	4,425,000
1900	154,430 "	5,635,000	2,604,000
1901	151,877 "	5,563,000	2,783,000

The foregoing data show that all owners of land, induced by the prices once paid for wine, went in for vine-culture since the last decade. The area under vines in the different provinces is as follows: Algiers 55,444 hectares, with an average production of 2,042,187 hectolitres; Oran 16,323 hectares, 698 397 hectolitres; and Constantine 85,105 hectares, 2,222,443 hectolitres. The average sale price during the last ten years was 17—20 francs for wine from hillsides and from 12—14 francs per hectolitre for wine from lowland—equal to between £3 and £5 per leaguer. Recently, conditions have changed in consequence of France, as the principal buyer in past years, having no need of Algerian wines owing to the superabundance of the vintage in 1900 and 1901. In many places vintage 1900 is not yet sold and people are not only in financial difficulties but are also unable to store the new vintage being short of room. During 1901 offers were few and ruling prices low and wine-farmers are, in spite of the indulgence shown by bond-holders, in an

* One hectare equals 2 5 acres or roughly equal to one Cape morgen.

† One hectolitre equal to 22 gallons.

awkward position, the value of property having so considerably fallen that farms once valued at 100,000 francs can hardly be disposed of at 25,000 francs.

Phylloxera has done damage only in the provinces of Oran and Constantine, in the former 1,672 hectares and in the latter 7,627 hectares have been destroyed.

C. MAYER.

UNKNOWN INFECTIOUS MATTER.

AN ESSAY BY DR. ERNST JOEST.

(Continued from page 131.)

In reply to the question :—What circumstances govern the limits of our microscopical powers of perception, or at what size is the limit to visibility placed?—Dr. Joest gives a detailed description of the manner in which a cone of light behaves when it is conducted to the prepared object by means of the lighting arrangements of the microscope which is somewhat technical for the general reader, but he follows the detailed demonstrations of the distinguished Abbe, who proved by experiment that the rays separated from the direct light by diffraction are not absolutely required for depicting large objects, but as soon as the dimensions of the object to be examined descended below the size of 20 m.m. a part of the diffracted light must co-operate for clear depiction of it, hence follows in the construction of the microscope, the demand to make the opening angle of the stronger objectives so large, that as nearly as possible all the bundles of rays led off by diffraction may enter the objective. But even with a very large opening angle as soon as the details of an object descend in their linear dimensions to too small multiples of the wave length of light, even a very large opening angle of the objective can never simultaneously receive more than a part of the whole group of rays produced by diffraction. When the object possesses such small dimensions that even the first bundle of rays produced by the diffraction cannot enter the objective simultaneously with the undiffracted cone of light, a picture will no longer be created, the object will no longer be perceived. It follows, therefore, that however much the microscope may be perfected, as far as the enlargement to be promoted is concerned, the limit of discernment for central lighting will never go beyond that of half the wave length

of blue light to any considerable extent. According to Helmholtz, the smallest discernible object when using white light would be 0.55 m.m. with central lighting, or 0.27 m.m. with slant lighting. For dark blue light the wave length of which amounts to 0.43 m.m. the relation is somewhat more favourable. But the size of 0.21 m.m. must be looked upon as the lowest limit of visibility. The violet light, the wave length of which is somewhat smaller than that of the blue hardly comes into consideration.

Photography, it is true, enables us to bring into view indirectly such objects as stand only a little beyond the limit just defined by the use of violet, or ultra violet rays, since these rays develop the greatest chemical activity.

The Doctor then states that it would be absurd to assume that the existence of living organisms ends at the limit of visibility which is governed by external circumstances. And why should not these very minute and invisible micro-organisms be endowed with the same powers of metabolism and multiplication, and act as morbid agents the same as the known micro-parasites?

The same reasoning applies to the failure to cultivate these minute micro-organisms.

THE CONTAGIUM VIVUM FLUIDUM OF BEIJERINCK.

The fact that the contagium of the spot or mosaic disease of the tobacco plant could neither be artificially cultivated, nor microscopically demonstrated, in conjunction with the fact that this unknown increasable infective substance was able to pass through the bacteria filters, caused Beijerinck to assume that this living increasable morbid agent existed in a liquid soluble form. (A living contagious fluid).

But as we have already seen, a living substance already exists in the form of a cell, and to this form all the functions of life are due. A formless living fluid, or a living substance in a state of solution does not exist. It is inconceivable. A living contagium can only exist in the form of an organised cell.

Further, with respect to the mosaic disease of the tobacco plant, Koning succeeded in infecting plants with infective matter which had been heated for five minutes at 100°C. The virus was merely weakened by this very severe interference, which was expressed by the lengthening of the period of incubation. A formless fluid substance would never have survived this test. The explanation of the power of resistance of the infective agent which produces the mosaic disease we must therefore assume to be due to its being able to produce spores.

FIXING THE SIZE OF UNKNOWN MORBID AGENTS.

The method which we make use of for arriving at the approximate size of unknown micro-organisms is filtration. The bacteria-filters may consist of various materials: Unglazed porcelain (Pasteur,

Chamberland); infusorial earth (or silica) (Berkefeld, Bitter); or hard-burnt clay (Pukall). These extremely fine-porous substances have proved impassable for the bacteria more closely known morphologically, even for the smallest of them, as well as for all known cells (therefore also for protozoa). If we therefore allow a fluid containing bacteria to pass through such a filter, we obtain a filtrate, absolutely free of bacteria, while the morphotic elements remain behind on the filter. In this way also the poisons and ferments (Enzymes), given off by certain bacteria can be obtained in a bacterially sterile form; for these substances being in solution are able to pass the filter.

When Loeffler and Froech, in Foot and Mouth Disease, the originating cause of which even these investigators could not find, tried to demonstrate dissolved substances in the contents of the aphthæ containing the infectious substance by the aid of filtration, they observed that the filtrate obtained (although "bacterially sterile") was just as able to produce Foot and Mouth Disease as the unfiltered contents of the aphthæ. How could this remarkable phenomenon be explained? The filtrate must either have contained "a dissolved" exceedingly effective poison" or micro-organisms of such extraordinary minuteness that they could pass through the extremely narrow filter-pores. This question could, as we have seen above, be decided by way of experiment in favour of the latter assumption.

As I have already mentioned all more closely morphologically known bacteria (and other protophytes) as well as protozoa belong to the micro-organisms kept back during the filtration. Even the smallest bacterium, we know,—the bacterium *influenzæ* R. Pfeiffer, is not able to pass the filters mentioned.

Among the unknown morbidic agents the agent of Lyssa (Rabies) (according to P. Bert and Babes), the agent of Rinderpest (according to Semmer, Kolle and others) and the agent of Variola and Vaccine (according to Schulz and Weyl, Weichselbaum and v. Wasielowski) behave on filtration like the known bacteria and protozoa. Whereas the agents of Foot and Mouth Disease (according to Loeffler and Froech), the South-African "horse sickness" (according to Theiler and McFadéyan), as well as the agent of the Mosaic-Disease in the Tobacco plant (according to Iwanowski, Beijerinck and Koning) are capable of passing the filters. As regards the behaviour of the unknown morbidic agents of the remaining Infectious Diseases enumerated above during filtration, I have found no data in the Literature [of the subject].

A special interest attaches to the behaviour of one morbidic agent during filtration which we must number with the known ones; for several years (since 1898),—the micro-organism of the lung-sickness ("Peripneumonia") of cattle discovered by Nocard and Roux. This micro-organism also is capable of passing through the filters in a watery mixture. The lung-sickness-agent according to Nocard and Roux is so small that one can still perceive it with very high microscopic enlargement in the form of minute, light-diffracting

movable points, but cannot distinguish its shape (in spite of coloration). The lung-sickness-agent must therefore stand close to the limit of visibility.

If we compare the fact, that the morbidic agents of Lyssa, (Rabies,) Rinderpest and Variola,—just as all morphologically more closely known bacteria and protozoa, are retained by the filters, with the behaviour of the only just visible Lung-sickness-agent during filtration, there follows of necessity the conclusion, that the unknown morbidic agents of the three diseases mentioned must be larger than the Lung-sickness-agent and must therefore also be discernible to the senses.

To the agents of the Foot and Mouth Disease and of the South-African "Horse-sickness" as well as to the agent of the mosaic-disease of the Tobacco-Plant which like the micro-organism of Lung-sickness are able to pass the filter we may as a maximum assign the size of the latter. For, as we may assume on the grounds of a comparison of the size of the Lung-sickness microbes with those of the Influenza bacillus of Pfeiffer retained by the filter, there exist no micro-organisms which, essentially greater than the Lung-sickness, microbe, can still pass the filter. As, however, the Lung-sickness microbe stands just on the limit of visibility, it is very probable, that the morbidic agents of Foot and Mouth Disease &c., are outside this limit, that they therefore are not discernible at all. According to the data made above as to the limit of visibility these morbidic agents would thus have to be smaller than 0.21 m.m.

What has been said here in regard to the relative sizes of the morbidic agents of Lyssa, Variola, and Rinderpest or Foot and Mouth Disease, South African "Horse-sickness" and mosaic-disease, applies correspondingly also to the unknown morbidic agents of the above named remaining Infectious Diseases, as soon as their behaviour towards the bacteria filters is settled.

THE SYSTEMATIC POSITION OF THE UNKNOWN MORBIDIC AGENTS IN THE DOMINION OF PROTISTA.

The question here arises to what division of the dominion of Protista, the Protophytes or the Protozoa, should be assigned these smallest living beings whose existence we are compelled to assume. The primary form of living beings is the cell, in which we must distinguish several characteristic components. Whereas this primary form in its peculiarities is maintained by Protozoa as a rule, the organisation of bacteria is such a simple one, that they, mostly, hardly allow of their cell-character being recognised any longer. We must therefore consider bacteria as organisms standing on a lower step than Protozoa. The bacteria on the whole are the lowest organisms which we know with accuracy. Besides their organisation they also distinguish themselves from the Protozoa by their average smaller size. The Protozoa, like all typical cells, do not descend below a

certain measure.* The bacteria, however, exceed the minimum size of the typical cells. It can therefore hardly be assumed that these smallest, invisible living beings belong to the Protozoa. We have far more probably to deal with extremely simply organised organisms which must either be assigned to the bacteria or are nearly related to them. Possibly however, these smallest micro-organisms form a separate, lowest class of the dominion of Protista by themselves.

The vaccine-corpuscles of Guarnieri which according to v. Wasielewsky "very probably" are the causal agents of Vaccinia (and Variola), would have to be accounted Protozoa. The vaccine corpuscles according to Kruse appear nearly related to the Amoebæ. So far we can say nothing as to where the morbid agents of Rabies and Rinderpest should be classed. The respective micro-organisms may as well be Protophytes (Bacteria, Blastomycetes) as Protozoa. Still less can presumptions be made as to the nature of the causal agents of the remaining Infectious Diseases not yet explained as to their ætiology.

CONCLUSIONS.

The preceding arguments have shown that the morbid agents of Lyssa, (Rabies,) Small Pox, and Rinderpest must be so large, that they are visible through our optical implements, but that on the contrary the morbid agents of Foot and Mouth Disease, the South African "Horse-sickness" and the mosaic disease of the tobacco plant must possess such diminutive dimensions, that they most probably stand beyond the limit of visibility, they are not perceptible at all.

Starting with the recognition of this fact we arrive at the conclusion that the efforts to discover the unknown morbid agents of the last mentioned diseases with the aid of the microscope, are from the first as good as hopeless. (For direct microscopic vision this applies at once. For making examination indirectly by means of photography the possibility of success would be given, if we could succeed in making useful light rays of considerably shorter wave-length than than possessed by blue light, presuming that the smallness of the respective morbid agents does not exceed even the limit to be reached by this method.)

It is different with Lyssa (Rabies) Small-pox and Rinderpest. The morbid agents of these diseases must, as has been shown above, be visible microscopically. Here farther microscopic researches therefore have hopes of success. In the case of Small-pox, whose agent is very probably identical with the clearly perceptible, comparatively large Vaccine (Variola) corpuscles, success appears already attained.

* To the smallest protozoa belong the Malaria-parasites in man. These are in a full-grown state 5-10. m m., in their youthful stage 1-2 m.m. in size (the largest Protozoa [living free] on the other hand are already visible to the naked eye).

For the investigation of the remaining diseases, enumerated in the beginning of this essay, we must first demand that their behaviour under filtration be examined.

This demand is readily met in the case of all the infectious diseases of animals and plants, as the filtered virus can be experimentally tried on the respective animals and plants, but it is difficult in the case of the infectious diseases of man which cannot be conveyed to animals.

The application of the test of filtration saves the investigator from hopeless microscopic researches in the one class of cases, and in the other class it inspires him with hope that he may succeed in his microscopical researches.

The application of the filtration test also saves the investigator from proclaiming a certain microscopic object the agent of a disease, when its behaviour under the filtration test shows that it cannot possibly be the agent of that disease.

The Doctor then asks, is there any other method by which we can acquire a knowledge of these invisible micro-organisms, and his reply is that if it is impossible to seize them directly, we must see whether we can make an indirect advance by an investigation of their biological properties. Before, however, we can think of closely investigating unknown micro-organisms biologically, it is necessary that we should search further into the secrets of the known micro-organisms, in order that we may be able to judge of the reactions of the unknown, by comparison with the bio-chemical reactions of the known micro-organisms. If we get to know the biology of an unknown micro-organism, in its most essential relations, we would be able to construct a more complete picture from its properties than the microscope alone could ever disclose to us.

Reference is then made to a disease of fowls, described by MM. A. Lode, J. Gruber, and Centanui, in which the infective agent was able to pass through a Berkefeld filter, the filtered fluid being capable of communicating the disease to healthy fowls in a chain of several animals, but they were unable to demonstrate the morbid agent either microscopically or culturally. We must therefore assume that we have, in this disease, to deal with a micro-organism which is too small to be perceived by the senses.

MM. Lode and Gruber, however, state "that even if we could not succeed in demonstrating the single individuals of these minute bacteria; their existence should make itself noticeable by the phenomena of their growth in culture fluid by turbidity, sediment, discoloration, the formation of gas or other processes of metabolism." The phenomena of growth may however, be so small that they can hardly be perceived.

MM. Lode and Gruber say further: "that the virus of these enigmatic infectious agents is nothing solid, but a dissolved substance endowed with the power of propagation, similar to that of an enzyme, which acts by the decomposing processes which it produces in the animal body without thereby consuming itself." To this Dr.

Joest replies:—The assumption of a virus consisting of “semi-fluid protoplasm” which by their state of aggregation differing from the more rigid bacterial bodies, should be able to pass the fine porous filters appears to me absolutely more forced than the view that there are micro-organisms of extreme smallness.

Further, “plasmodial corpuscles” which can alter their shape, are restricted to certain alterations of form. It can hardly be assumed that such Amœboid bodies of any size could flow through a narrow filter pore, unless it be that they are so small, that the passage through the filter pores is impossible for them as they are.

An infective agent in the form of a dissolved enzyme which possesses the property of increasing its substance is, as I have tried to prove an impossibility. Moreover, Lode and Gruber themselves felt the untenability of such an assumption for they say: “it seems to us more difficult to form an idea of such a substance, because so far we possess no analogy and subjectively we cannot justify such a belief.”

D.H.

CORRESPONDENCE.

KRAAL MANURE V ARTIFICIAL.

Sheep and Angoras.

Farmers and Veterinarians.

General Criticisms.

To The Editor AGRICULTURAL JOURNAL.

SIR,—Somewhere in the Journals of 1900 you will find a query from me *re* Sheep Kraal Manure. I was pleased to see a good many farmers went for the “Replyer” pretty straight. It is not nice to be told a thing is no good when it has proved over and over again that to right old played-out soil dump loads of Kraal Manure on it. I well remember how disgusted I was with the answer. For instance I was advised to break the manure lumps with a spade after spreading out to the land. I would like to see any one at it. The answer I was expecting was:—Make pits outside your Kraal about 4 feet in diameter and about 10 feet deep. Then every fortnight, say, get your boys to clear your Kraal and fill up the pits with the new manure thus cleared. Then instructions, I thought, would follow as to keeping the manure damp etc., and increasing rapidity of rotting.

Then instructions also as to how much to put on the lands. As there was a press of work just then and being in the D.M.T., I was often away from home so dropped the subject, but now that the war is over and we have once more taken our much neglected farms into our working clutches again, I would very much like to hear again about Sheep Kraal Manure. Some of the old hands tell me not to use fresh manure as it is apt to "burn" the stuff when young, others again say use it fresh. Without doubt it is a wonderful thing for tobacco as most of the Kat River tobacco growers will tell you and I am very much afraid that my old "Replyer" doesn't altogether know what it is made up of. One thing I am certain of and that is we can't find a cheaper manure at present, and much as we hear and read of "artificial" they will never come into favour on a farm that kraals two or three thousand sheep and cattle besides. There are many such round and about, and Dame Nature has given us that means of renovating our "Uitgepit lands" and we intend to obey her. Artificial is all right in England where Kraal and stable manure is not so plentiful and I contend that if we can put a few loads of manure on a small piece of ground and get good results it pays better than experimenting with expensive artificials that in the majority of cases have a peculiar liking for one plant and ignore another, whereas the old fashioned manure likes and feeds them all. I have seen manure spreaders advertised in English papers; now that would be a fine addition to our farm machinery. I was thinking of boring holes in the bed of a Scotch cart and working the manure with a spade at the top to keep it sifting through, but gave up the idea as it would mean that I could only put a little in the cart at a time. The Cathcart farmer's idea about putting loads of manure at the edge of the furrow and shovelling it in is a splendid plan. We have a piece of ground about 250 yards by 150 yards and for a long while we have each year been getting a crop of forage and one or two crops of tobacco in one season. Sowing forage in May and reaping in October then tobacco in November and cut about February letting the stubs grow a second tree and cut about the end of April. The fertility of this patch was kept up by shovelling in old manure into the water.

Some time ago also a correspondent from Argentine said the farmers there were in a dilemma because their sheep had too much mutton and too little wool. He and the Editor of the Journal were at a loss to know what breed to go in for to bring their sheep back to a wool producing sheep. Many farmers in the Colony could easily have told you and I am surprised that none did so. Perhaps it is a certain modesty that possesses most of them. At all events I am sure we don't give ourselves enough credit for our methods of farming and I don't think I am far wrong when I say that you will find as progressive and intelligent farmers in this old Colony as you will find anywhere in the world, but the most of them very seldom write to the Press or Agricultural Journal for some reason or other. One I think is that they think they will only be saying things that

everybody knows, but it is not so, and Africa requires different handling in the Agricultural and Stock farming line than other countries. Our soil is different, our climate is different, our tastes are different, our objects in many cases are different.

I was advised by an up to date farmer to use Vermont Sheep among a mixed lot that I bought as a start, "because," he said, "you must bring your sheep within as short a time as possible to a uniform size, a uniform length of staple and quality and a uniform weight of wool" and I did as he told me with startling results. So much so that I have better sheep than the parents from which I bred from first. So I would tell that Argentine Correspondent to advocate breeding Vermonts.

Now we all know that our Mohair trade to-day has been due to the introduction of good goats from Turkey and we have advanced so rapidly with that industry (?) that Turkey even must take a back seat, so when I say the Vermont sheep will breed true to Vermont, I don't mean that the Argentine farmers should get Vermont Rams from America because there are as good Vermonts in the Colony as there are in the place from where they originated just the same as there are every bit as good goats here as there are in Turkey.

Dear Mr. Editor forgive me for writing so much, but before I close I would like to say a few words about the answers we get from the Vets! They are generally useless. For instance one farmer writes: "Please give me a remedy for sore eyes in sheep?" That is a broad question I'll admit, but it is not so broad that a "Vet" must go for that farmer for not telling him whether "The grass is long," "Whether the sheep have just been shorn" etc. etc., They have remedies and could give them straight away, viz, Boracic puffed into the sheep's eye by means of a little "Blower" that is generally sold in connection with Keating's Insect Powders. This was a remedy given by Dr. Hutcheon I believe. Then again a farmer writes "My horse is off his feed. Keeps poor. Feed him well but he won't fatten." The "Vet" immediately jumps to the conclusion that the farmer is not giving him the right kind of food, when a little thinking would show that farmers here, in ninety nine cases out of a hundred, use Forage, Barley, or Mealies, or Lucerne. We haven't got any Linseed Cake etc. etc., that they use so much in England, and if a farmer says he has tried to fatten a horse and can't you can depend upon it that no one else will fatten him unless medicine is used. Worms are mostly the causes of a horse not fattening, and a "Vet" could give a simple remedy as an experiment. We don't want long prescriptions to go to a chemist with, but some household remedy such as a teaspoonful of Cooper's Sheep Dip Powder etc, etc. Then again we see long reports about the Malignant Jaundice of the Dog, and discovering this Bacterium and so forth, then we lazily turn over to see if any mention is made of a cure. No! No cure. Not positive enough. The same with all the diseases our stock get. It is really the farmer who has to plod and mess about with all sorts of home medicines until at last he discovers a cure, such as Cooper's Powder. I daresay

this will raise a storm of abuse from the Vets but I fail to see that that "body" are indispensable to the farming community of Cape Colony. We might extend our Bacteriological Institutions and get a few more Edingtons among us, yes! Ah! then I for one won't grumble.

Success Mr. Editor to the new Journal. Trust you will find space for this and that the farmers in general will give you further ideas to write upon.

Yours sincerely,

J. D. MILLS.

Post Retief, October 2nd, 1902.

PRUNING CITRUS TREES.

To the Editor AGRICULTURAL JOURNAL.

Sir,—The October issue of the *Journal* was the first I have seen for over four years, and I feel only too pleased to say that now you have opened your columns to free criticism, you will not only get your best points from your critics, but you will—for the first time—*interest* your readers by learning their views and requirements generally. Conservative practice and progressive theory will thus see the common object aimed at with the eye of a "good understanding," and mutual respect.

Now while I quite agree with you, that as a general instruction the knife is the very worst tool in the hands of a Citrus growing *novice*, yet the impression given by it is *too lasting*, and on the whole does more harm than good from a pecuniary point of view, because even if a Citrus is growing freely in good and moist ground the fault of too dense a foliage is an immense crop one year and practically nothing the next, with a dead tree when it should be in its prime.

I have visited possibly every grove in Natal worth seeing, many in the Cape Colony and a few remnants in the Old States, and I may certainly say without exception that the best fruit, most vigorous and regular bearers, and healthiest and best trees were those with the fewest branches and none below three feet from the ground.

The closer the foliage, the weaker the fruit twigs, the more numerous the stems and branches, and the less the fruit, with greater impoverishment of the ground.

The more open the tree, and more vertical the habit; the hardier the fruit twigs, the greater the fruit yield (in marketable value), less dead twigs, and no loss of vitality.

Perhaps one of the best illustrations of this in South Africa is at Marian Hill and Wasch Bank in Natal. The main branches in these trees are easily traced (while standing several yards off) from the bottom to the top.

Of the many thousands of Citrus trees I have personally observed in all parts of South Africa fully ninety per cent would have proved more profitable, from every point of view, had they two-thirds *less* branches.

To remove these branches at the present time is a very risky business for a novice (yet not nearly so risky as to climb an orange tree with boots on) and nothing but a thorough knowledge of hardwood trees and a liberal application of "home-made Shellac knotting," will succeed.

I quite agree with Mr. Goulden that when buds have been allowed to grow into twigs, the twigs must be removed but when twigs have grown into branches it is too late for the man who has but a few dozen orange trees, to remedy it, except as an object of experiment.

The nearer the branches to the ground the greater the risk of root-rot *in a wet season*, but the less risk from over irrigation in a dry season.

Orange growing to succeed like everything else must be a matter of head as well as hands, both applied energetically and persistently; and the man who attempts orange planting, with insufficient knowledge, is like a blacksmith enlarging his business with "Millinery" in the other corner!

Yours, etc.,

W. E. MASTERS.

Clay-pits, Grahamstown.

HEARTWATER AND REDWATER.

To the Editor, AGRICULTURAL JOURNAL.

Sir,—I read with considerable interest Mr. Lounsbury's treatise on the above subjects, also your notes and suggestions on same—in the October journal.

No doubt the eradication of ticks would be a most effectual way of ridding the Colony of many diseases, but it would be a most costly operation in such a vast country as this and would take half a lifetime to complete. I think you might, just as well, try to kill all the flies which are also a means of spreading diseases.

I am afraid if Mr. Lounsbury's method were adopted with the object of stamping out heartwater many more thousands of sheep would have to succumb before any appreciable decrease of disease would be observable.

In the Central Albany district Dr. Purvis of Grahamstown carried on a series of experiments in inoculating for heartwater—and to the entire satisfaction of some of the farmers. One farmer told me that he had not lost a single sheep out of three hundred, that had been inoculated by Dr. Purvis, after a lapse of nearly three years.

The Central Albany Farmers' Association took the matter up very keenly and approached the Government with a view to the adoption of Dr. Purvis's method. After a lot of correspondence and worrying up, the Veterinary Dept. consented to test his method and a series of tests came off in Somerset East about April last, the results of which have not been published. Now Mr. Editor! I notice in your remarks that you urge upon the farmers to bestir themselves; we have been worrying up for the last three years with the above result.

We are confident that excellent results will accrue from Dr. Purvis's method. Considering the amount of money that has been wasted, especially at the Bacteriological Institute, Grahamstown, for ten years in trying to discover some preventive against this fearful scourge, without any result, surely a few hundreds might be spent in proving Dr. Purvis's method properly. Farmers, as a rule, are practical men and no theorists. They believe in ocular demonstration and Dr. Purvis has proved to them that his method is a good one.

As this matter is of such vital importance to a sheep farmer, surely the Government ought to be ready to take advantage of any discovery that may prove such a boon to the country.

Now with regard to redwater—the sooner all the cattle in the Colony are inoculated the better. The disease can be stamped out by inoculation with very little risk. Numbers of farmers can now take the blood from a salted beast and inoculate for themselves.

I may say that nearly all the cattle in these parts are inoculated and we no longer dread the disease. The same might apply all over the Colony. Before concluding I should like to say a word about scab. I quite agree with A.W. that it would be a crying shame to enforce simultaneous dipping on farmers who have had their flocks of sheep and goats clean for a number of years. It ought not to be enforced upon anyone who can show a clean bill for one year.

The object of the Scab Act is to make the careless and indifferent farmer clean his flock, and if the Scab Inspectors were instructed to pay all their attention to the dirty farms we should soon get rid of scab. There have been thousands of pounds wasted in trying to eradicate scab in the Colony, and thousands more will be with the present rotten system. I don't wish to be misunderstood. I would very much like to see all the bont ticks destroyed, but it would be a too costly and lengthy an operation in my humble opinion.

I am,

Yours faithfully,

W. H. PUGGITT,

Highlands, Cape Colony,
October 13th, 1902.

SIMULTANEOUS DIPPING.

Another Protest.

To the Editor, AGRICULTURAL JOURNAL.

SIR,—I was pleased to find "A. W's" protest against simultaneous dipping in your October issue. As one who has had a clean bill for many years and the owner of 5000 sheep may I add to the protest? "A W's" suggestion that the men who hold clean records should be consulted in drafting an act is good. Labour is as scarce among the sheep-farmers as it is among the fruit growers of the West and under present labour conditions it would be impossible to carry out simultaneous dipping so thoroughly as to make it effective. For one reason, in this part of the country, our sheep run day and night in paddocks and it is almost impossible to collect every sheep, if one is ill it hides away. If a few escape, the country is no better off than it was before. I also object to be heavily fined by the cost and labour involved in dipping to encourage the men who breed scab, it has been tried once and it was a failure. Now would it not be better to enlist the co-operation of the owners of clean flocks, who are the deadliest enemies the scab insect has, and tell them that there are so many infected flocks in their district and ask them on a certain day to help dip these flocks at a price that will cover cost of labour, also to take their boys and thoroughly search these farms so that no sheep escape, to disinfect all sleeping places with spray pumps, and to inspect all flocks adjoining infected ones, and satisfy themselves that they are quite clean. You may take my word for it that this would be thoroughly done and a big blow struck at scab in the more civilised districts. The prelude to this would have to be increased vigilance on the part of the local scab inspector so that he would know where all scab was and owners of flocks who have not held a clean bill for the previous twelve months should be treated as scabby.

Yours, etc.,

R. PELL EDMONDS.

Ripplemead, Kubusie.

CRIMSON CLOVER.

To the Editor AGRICULTURAL JOURNAL.

SIR,—Some three years ago I obtained some seed of Crimson Clover (*Trifolium Incarnatum*) to sow, as an experiment. The seed was sown in a young fruit orchard, to be ploughed in; and also on a strip of fallow land which had grown oats.

It germinated and started well but never grew into a crop, seeming to be stunted for lack of nourishment. Nevertheless, it sprang up

again the next year and this year is growing healthily and well and I am cutting it for my horses. The land in both cases has been under cultivation meanwhile, and the oatland under crops. I have had much the same results with vetches.

My own conclusion is that some of our land at least is 'clover sterile,' that is without the nitrifying organisms by help of which clover draws its supplies from the air, but I imagine that the first plant inoculated the soil where it stood for the benefit of succeeding generations. It would be interesting to test the effect of inoculating some of our soils for clover, from clover-fertile ground.

Yours etc.,

P. HAVERS.

Thelema, Stellenbosch,
Oct. 20th, 1902.

[The theory is ingenious, but a little far-fetched. It would be of interest to know at what season the clover was sown and if it flowered the first season.—EDITOR *Agricultural Journal*.]

GRAFTING CHESTNUT ON OAK.

To the Editor, AGRICULTURAL JOURNAL.

Dear Sir,—Could any of your readers tell us what success they have had in grafting chestnuts on young oaks; we had one tree grafted on oak about seven feet high and last year we got about 25 beautiful chestnuts from it, but this year it has suddenly died.

Yours etc.,

LOUW BROS.

Neethlingshof October 23th 1902.

The result is only what was to have been expected. The grafting of chestnuts on oak is seldom a success and the plant is invariably short lived and unreliable.—EDITOR.

QUERIES AND REPLIES.

A Foul Pipe.

A Frontier correspondent wants to know how to clean a foul—though favourite—pipe, and offers apologies for putting the question by saying that by giving the farmer a method of extracting the nicotine from old pipes he is loth to give or throw away, we shall be doing him a splendid turn. We fully sympathise with the sentiment and wish it were possible to supply the remedy. All that can be done is to clean the pipe frequently, by a steam jet if possible, or by boiling in soda and water. Spirit is also a good cleansing medium. But these only clean the channels. The nicotine soaks into the wood fibre in the form of what is practically an essential oil and we know of no means of extracting it. When the pipe-cleaning operation is toward, it is as well to get plenty of ventilation.

Italian Bees.

Can you tell me if anyone has imported the Italian Bee into this country, and has succeeded with them? My farm is a splendid bee-pasture, but the present swarms there are too vicious and uncontrollable for market purposes.

W. E. MASIPERS.

P.O. Martindale, 23rd September, 1902.

Some few years since, one or two bee enthusiasts brought out some Italian bees but we have not heard of any success. Perhaps some other correspondent might be able to supply information as to any recent arrivals. While on the subject of Italians it might interest W. E. M. to know that apart from their docility which is certainly a good feature when the "strain" is *kept pure* our experience is that other characteristics are very similar to the South African bee and it is very doubtful if a cross between the Italian and South African bee would be very satisfactory in the direction of docility. It is well known that the Italian queen crossed with the English drone produces a "hybrid" of an exceedingly bad temper. And to keep the "strain" pure after the first season or two in this country would be well nigh impossible unless the importations were conducted on a large scale.

H.L.A.

Exhausted Cereal and Tobacco Lands.

A Transvaal correspondent writes:—

I would esteem it a favour if you would kindly give information on the following points:—What properties are extracted from the soil by (a) Oathay, (b) Wheat, (c) Tobacco, and what are the best manures to *grow* on the respective lands to replace what has been taken out by the crops mentioned. I find it impossible in the country to obtain sufficient kraal manure to treat big lands."

The following reply was forwarded by post:—The proposal to grow a crop upon land for green manuring, preferably a leguminous crop, and to plough it in, is excellent as far as it goes. But it must be remembered that the main advantage of this proceeding is to enrich the soil with nitrogen. Beyond the addition of humus, or vegetable mould, and the mechanical effect of disintegrating the tilth, it will have little other virtue.

Now, as the exhaustion of the land is brought about by continual cropping with cereals especially, it is most likely that the present poverty is owing not to lack of original nitrogen, but to the loss of its phosphates. Wheat and other white crops are greedy of phosphates, and not been consumed on the land as grass and dodder are, do not give any of them back in the form of droppings, unless heavily manured of set purpose. In South Africa, too, the natural content of phosphates is very small to begin with, hence the paramount necessity of restoring these constituents in some form or other to all wheat lands.

There are two ready sources of phosphates besides the universal stable manure, which, so far, is a return of the decomposed straw of the crop of the land—these are Bone meal and Thomas' Slag. The former contains the phosphates which the cattle have used from their food to build up their solid skeletons; the other contains phosphates of lime withdrawn from iron ores in the Bessemer process of smelting. Both, to be of any use, are reduced to a fine powder, spread broadcast and then turned into the tilth. The action of the air, rain and carbonic acid of the soil slowly renders them soluble so as to enable the rootlets of the next crop to take up the phosphates they contain.

Of course it would be easy to determine by an analysis of the exhausted soil whether the forecast now made is correct. I should, however, be inclined to lay down exhausted corn land, if possible, for a couple of seasons to crimson clover, which is a leguminous crop and therefore a great accumulator of nitrogen, dressing first with Thomas' Slag and Lime. This would give a valuable crop which could be used for fodder as well as for turning into the land. In two years' time the land could be returned to wheat culture with advantage.—E.P.

Green manuring for tobacco is recommended as an excellent remedy which, when properly applied raises the quality of the product infinitely. The plants used principally for green manuring are the Lupin (*Lupinus albus*), the Spurrey (*Spargula arvensis*), the Vetch (*Vicia sativa*) and various cereals. The seed should be sown after the second ploughing, about eight or ten weeks before the tobacco plants are put in. As the object of green manuring is to produce as much organic matter as possible the seed should be sown thickly. The green manure is ploughed in shortly before the formation of the flowers and the tobacco plants are put in immediately afterwards. As tobacco is very exhausting to the soil it is advisable to grow other crops. The following rotation being recommended:—First year, corn; second year, potatoes (to be manured); third year, green crops ploughed in and tobacco immediately afterwards.

Drifting Sands

To the Editor AGRICULTURAL JOURNAL.

Sir,—A portion of my farm (to use a local phrase) has started to “blow,” consequently destroying a large portion of my grass veld. Could you through the medium of your journal recommend measures by which I could successfully cope with the difficulty?

Yours etc.,

Bathurst.

W. A. E. RANDALL,

It is presumed that by “blowing” our correspondent means that loose sands are beginning to drift before the prevailing winds. In that case, the best thing to be done is to keep all stock off that part of the farm, cover the bare places with bush and sow rye grass as early as possible. This “blowing” is a serious menace in many districts and soon gets beyond control. The preservation of the natural herbage and bush is the only sure preventive. The bush acts as a windbreak and the herbage keeps the loose sands covered.

Swiss Cattle.

“Aliwal” writes:—“A friend of mine has written to me about a certain kind of cattle that he has seen in Switzerland. He states, they are a big beast with lots of milk and apparently very robust constitution. In colour they are mostly dark cream with white faces. Do you know what breed they are called and further characteristics of same?”

"Aliwal's" friend has evidently come across cattle of the "Simmenthaler" breed which is of Swiss origin but is now found widely distributed over South and Central Germany. The Simmenthaler is one of the largest of continental cattle, fat bulls weighing about 2,000lbs. They are not quick in maturing and tend to lay on lean meat and much internal fat. They are in general use for draught purposes, the cows are moderate milkers, the milk is largely used for making butter and yields an average of 3·7 per cent. butter fat. These cows are chiefly kept in the stalls and highly fed although I have also often seen them grazing on mountain slopes in the forest. They are said to be easily affected by heat and are scarcely to be recommended for trial in Cape Colony.

E.A.N.

The Castration of Animals.

A Uniondale Correspondent writes :—

"Can you favour me with directions shewing the proper methods of castrating donkeys and mules. I have suffered some loss from the primitive and barbarous way such animals are treated here to say nothing of the needless pain inflicted. I should be glad if you could inform me what is the best material for tying the artery and if an antiseptic is advisable, what you recommend for the purpose. People here perform the operation without any precautions to prevent excessive bleeding."

The question was submitted to Mr. W. Robertson, M.R.C.V.S., of the Colonial Veterinary Department who returns the following report :—

Success in this operation depends upon the cleanliness and care with which it is performed.

The age at which the animal is to be operated on depends upon his condition and growth.

The operation should not be performed during very cold weather when a keen easterly wind is blowing or when flies prevail.

The animal being in fit condition should be cast for the operation. (The simplest method is to employ the long double rope or reim, a loop is passed over the neck, the two loose ends passed between the fore and then the hind limbs, separated and after being shaken down into the hind fetlocks bring it up outside the limbs and passed through the neck loop).

The animal being cast is placed upon the middle of his back and kept there by a bag of chaff at each wither. (Note: After casting it is as well to include the fore feet in a half hitch of the rope otherwise they may injure the operator).

The whole scrotum, penis—which should be pulled from its sheath—sheath &c., should be thoroughly scrubbed with warm water

and soap and finally with disinfectant and water (Jeye's or Little's Dip one part, Water thirty parts) and the whole surface dried with a clean towel.

The animal being now prepared for the final act of the operation may be deprived of its testicles in a variety of ways.

I. *Simple excision*, or cutting and scraping the cord.

This may be done in young or poor stock but frequently is followed by severe bleeding and even death.

II. *By Ligature* or tying the Artery of the cord.

This is a favourite and fairly successful method but is attended with some risks, it seems as if the ligature in cases acts as an irritant and tends to the formation of an abscess.

The scrotum is opened with a clean knife, the muscle of the cord severed and a ligature (cat-gut soaked in disinfectant is the best) put on the artery, the testicle cut off and the animal released.

III. *By Torsion* or Twisting.

In this method the scrotum is opened by a clean sweep from a sharp knife, and the cord compressed in a clamp or clam, the testicle is then seized by another pair of pinchers and twisted round until the cord and artery are severed, this method has been attended with much success.

Many operators sever with the knife the cord and muscle and so have only the artery and vein to twist through.

IV. *By the actual Caustery* or Hot Iron.

In this method the testicles are exposed by cutting the scrotum with a sharp knife, including the cord in a pair of clams squeezing tightly and severing the cord with a hot sharp iron, after removal of the testicle the clams should be gently slackened and the bleeding point noted then tightened up and the searing iron again applied until the blood has ceased to flow.

The cord is then released and a similar course employed in regard to the other testicle.

A little Iodoform ointment is a useful adjunct in which to dip the iron previous to searing the cord as grease prevents the adhesion of the tissue to the metal and it is also advisable to put into each hole in the scrotum a piece of ointment the size of a marble. This is the method I favour, it is speedy, clean and there is little or no hæmorrhage or bleeding following the operation. I have frequently opened the scrotum by means of the iron when the knife was not at hand.

It is advisable that the colt should move about after castration, it is not good to shut him up in a dirty or crowded stable, exercise diminishes the risk of excessive swelling. The animal should be examined two days after the operation and if the edges of the scrotal wound have closed up, a greased little finger must be inserted and the discharge which is in the scrotum released.

The clams for both forms of operation can be purchased at Messrs. Arnold and Co., West Smithfield, London, can be made by any smith and must be kept bright but not too sharp by a file.

The ointment consists of Iodoform one ounce, Lard unsalted 1 lb. melted together.

Some operators sever the cord muscle with a knife and cut the artery with the iron, I have generally employed the iron for the whole operation.

If the cord slips from the clamps and heavy bleeding ensues, finish the operation i.e. remove all testicles and plug the side of scrotum which is bleeding with *clean* cotton wool, and fasten lips of scrotum with pack thread and needle and remove plug in twenty-four hours

There are other methods of castration, but the above are the most common methods employed. It would be as well for a beginner to try his hand on young oxen previous to starting on horses as this would give him both dexterity in manipulation and confidence in his own capabilities.

COUNTRY REPORTS.

Crops and Stock.

Conditions and Prospects.

Molteno.—Early rains fell this season rather above the average, and since then the weather has been threatening and very hot for the time of year. The condition of the veld is excellent, and all stock is improving. If rains keep on a record season is expected. Locusts have not made any appearance as yet. Wheat is growing well and heavy crops are anticipated, while oats and barley are most promising. Rye is largely sown for winter feeding. Lucerne is not common in the district though it does very well here. The late frosts have nipped the fruit. Peaches and plums do well here as insect pests are rare. Cattle are rather poor on account of the severe winter but they are improving. Rinderpest is threatening and the calving season is just beginning. There is no dairying on a large scale but individual farmers do a good deal. Slaughter cattle are poor and scarce though prices remain very high. Horses are also scarce in this district but are being bought now. Prices of good animals are very high and glanders is prevalent among those from the military camps. The condition of the sheep in this district is very good though scab is prevalent. The lambing season has proved excellent. Slaughter stock are scarce and prices are going up daily. While there are very few Cape sheep here owners are

going in largely for cross-breeding with the Persian on account of the good market and this will in time, it is feared, affect the wool output of the district. The few flocks of Angoras in the district are doing well. Pigs, which are found on nearly every farm, are generally prospering.

Lady Frere.—The weather has been very windy, and frost late in September did some damage to the potatoes. The condition of the veld is very fair but rain is much needed as the grass is dying off again. Cereals, fruit and vines are not grown much in this district and mealies and kaffir corn are not sown yet as the natives are waiting for rain. The general condition of the cattle is fair and the calving season good, but Rinderpest has carried off about 100 head since August. Slaughter cattle in fair condition commanding high prices. Horses are scarce and suffering from mange which is general in the district, otherwise their condition is fair. Sheep are in fair condition with very little scab, the prices of slaughter stock being high. Pigs do well here and a very fair trade is done in them by the natives.

Victoria East.—High winds have prevailed lately accompanied by spells of hot and cold weather, but in consequence of the advanced state of the veld and early spring the grass and vegetation continues to look green and healthy. Although frosts have been late this season the fruit trees do not seem to have suffered and the indications point to a good crop. Oats are ripening, but are not so good as last season, and in many parts of the district reaping has already commenced. Rain is wanted in order to sow mealies and kaffir corn. The orange trees are suffering from scale. Cattle are in fair condition though there are a few cases of sponziekte and the calving season promises well. Dairying is just starting but there are no creameries as yet and no cheese making. Slaughter animals of all descriptions are doing well and command high prices. Horses are prospering and fetch from £25 to £45 for good riding or draught animals. This is not a sheep district, a few Persians are doing well. Goats are doing fairly well but heartwater is carrying off the kids. Ostriches are not doing so well this season though the pluckings promise well. The September rains caused heavy loss with the nests.

Ladismith.—The rainfall has been very heavy and the season compares very favourably with the best on record. High winds at the beginning of October damaged the crops somewhat but there were no hail storms. The veld is excellent for the time of year and promises good results later on. Wheat is looking well though rust has appeared. Oats were not much sown but the little there is is good. Mealies and other grains are also promising. Lucerne is coming into favour as it pays well in some parts of the district. The fruit season

is very promising and the vines look well. The latter are all on Capestocks. Cattle generally are fairly conditioned and the calving season promises to be satisfactory. Dairying has not caught on yet. Horses are varied in condition and draught animals are scarce the market ruling firm from £25 upwards. Mules from £20 to £21 5s. upwards. Cape sheep—our only flocks—are doing well and slaughter animals are in good condition. The ostriches are doing very well and there is no sickness among birds of any class.

Herbert.—Weather fair, with light rains about the same as last season. The veld is now getting green from the September rain fall. Of cereals and lucerne there are none to speak of in the district. What fruit there is has suffered slightly from the frost. The cattle are now doing well and are recovering from lung sickness and rinderpest, but there are very few calves as yet. Dairying is gradually being taken up and there is a fair output of butter. Horses are in fair condition but mange is prevalent, they are realising from £25 to £35, mules from £30 to £35 and donkeys £13. Sheep are all doing well and are in fair condition. Angoras the same, an excellent clip being anticipated. The ostriches are all doing well and the few pigs we have are also prospering.

Alexandria.—The weather has been changeable and stormy for some time with continuous rains in excess of previous seasons. The condition of the veld is excellent, and all standing crops look very well, particularly oats, a larger acreage than usual, which promise a heavy yield. Cattle are doing well with the exception of a few cases of lamziekte and sponziekte on some of the farms. Slaughter stock scarce and dear. Horses are scarce and though a few are in low condition are generally doing well. They are in demand at from £25 to £40 each. Sheep and goats are scarce in the district, but ostriches are plentiful and are doing well.

Albert.—The rainfall was good in September (2·56 in.) but has been very light since and though the season compares favourably with others it is rather dry. The weather at the commencement of October was very stormy and cold, but the veld is good for the time of year. If locusts and frost both keep off and seasonable rains fall, a good season may be anticipated. The former appeared in small numbers but made off to the south-west and disappeared. Burrweed is making headway. Wheat is promising, so are the oats of which a large quantity was sown. Lucerne is not planted much but large quantities of potatoes are in the ground and there should be a big crop. The fruit has been nipped by the frost and some of the peaches are covered with green lice. The few vines in the district are healthy and are doing well. Cattle are doing well with few

exceptions and a good calving season is excepted. Slaughter cattle are scarce and dear. Horses generally speaking in good condition for the time of year but many are scabby and poor. Prices are ruling very high. Donkeys and mules unobtainable. Horses rule from £25 to £40 for riding and draught. The sheep are not doing so well. The lambing season has not resulted well and nearly all the flocks are badly infected with scab. Slaughter stock is scarce and fairly conditioned. The September rains slightly improved matters but prospects are far from satisfactory for the wool clip. Angoras are doing splendidly and a heavy clip is anticipated. Ostriches are doing well, the chicks are very healthy and the plucking promises well.

Tarkastad.—The weather continues warm and windy with very little rain. It is drier than last year. The veld is not so good as it might be and rain is much needed. Wheat, oats, barley and lucerne are doing fairly well though they all show signs of the drought. Heavy frosts have damaged the fruit crops very seriously and the codlin moth has made his appearance. Cattle are all doing well and there is no sickness while the calving season is expected to realise all expectations. Bowkers Park creamery is fairly supported from parts of the district and a fair amount of butter is made by the farmers individually. Slaughter cattle in fair condition and command high prices. Horses scarce, and dear, ranging from £35 to £60. Some very poor and scabby mules £25 each. Sheep are doing well, scab is not so prevalent generally, and a good wool season is anticipated. Angoras are also doing well and a heavy clip is expected. The kidding is good. Ostriches are also doing well and pigs are generally in good condition.

King Williams Town.—With the heaviest rainfall known for many years the hot and dry winds in many of the wards of the district make rain badly needed again. The veld is excellent and has seldom been better at this time of the year. Cereals generally are looking very well indeed though some are showing signs of rust. Fruit is not promising well and there are practically no vines. Cattle are doing well, speaking generally, and the calving season promises well. Dairying is fair but there is no creamery or cheese factory in the district. Horses are in fair condition but scarce and dear averaging about £25. Mange is prevalent. Sheep are doing very well and the wool season is full of promise. Slaughter stock doing well and commanding high prices. Pigs also do well here.

Barkly East.—The heavy rains give a prospect of a good season, the best for many years, the weather is windy and cold but the veld is improving fast. No locusts as yet. Wheat is very promising and oats good; mealies just sowing. Frosts and high winds have

damaged what little fruit is grown here. Cattle are weak from the severe winter and there are several cases of lungsickness. The calving season is fairly good but the cows are weak. Horses and mules scarce and low in condition. Markets firm, riding horses from £20 to £50, draught from £50, to £75. The sheep suffered a good deal in the winter but are now recovering. Scab is prevalent.

Burghersdorp.—With average rains the season compares well with its predecessors. The weather is warm, and the veld good with plenty of vegetation. Wheat and oats are both doing well and fruit is plentiful. Cattle are doing well but rinderpest is on several farms. The calving season was good. Horses are doing very well this season, also goats.

Robertson.—Unsettled weather with strong North-Westerly winds and rains have been the prevailing features. September was the wettest month known for many years. The veld is excellent and stock of all kinds are rapidly improving. All cereals are a bit backward, but otherwise are mostly doing fairly well. Rust is attacking the wheat and spreading in several wards. Algerian Oats are doing very well. Lucerne is doing well and coming more into general favour. It promises to have a great future in these districts. Fruit looks well and there are prospects of a good crop, especially of peaches, pears, and walnuts which are blooming well. It is early yet, however, to make a definite forecast. The vines promise exceptionally well, having recovered from the effects of the frosts of the last two years and are again showing strong, healthy growth. American stocks are few. Cattle are doing fairly well but the general condition is below the average owing to the lateness of the winter rains. The calving season promises well. A fair amount of butter is made and the separator is a favourite on most farms, but there are no creameries or cheese factories in the division. Slaughter stock is improving and selling at high rates. Horses are scarce and below the usual condition for the time of year, serviceable draught animals (horses or mules) go as high as £30. Attention is again being given to horse breeding in this division. This is not a sheep district but the small flocks are doing well. Goats (Afrikander) and pigs are both prospering. Ostriches are doing well though some of the young birds are suffering from tapeworm.

Mossel Bay.—September was windy and very wet, but October calmed down a little. Fortunately hail has been absent. The veld is in prime condition and may improve later on. In cereals wheats and oats are doing well and good crops are being anticipated. Mealies are planted along the Gouritz River but make no show as yet. Lucerne is growing in favour and in at least two wards is extensively cultivated and doing well. Fruit promises well, oranges in particular being in excellent condition. Cattle are doing well with

the exception of a few cases of sponsziekte. Dairying is not general as yet. One private creamery does fairly well, and butter making is carried on extensively by individuals but there is no cheese making. Horses are improving and command from £20 to £40. Mules £20 according to size. Sheep are doing well, the wool clip promising to be excellent. There is some scab in some of the wards but as a rule the division is fairly free. Ostriches are doing well on the whole though tapeworm is playing havoc among the birds in some parts, and in others the feathers have suffered a good deal from the prevalent rain. Lucerne is mentioned as "appearing to be an antidote for tapeworm." Cape goats and pigs are prospering.

Malmesbury.—From a wet and cold September we have passed to a hot and dry October and the season though a little late is full of promise. The rainfall is above the average of several years past and the condition of the veld is grand. Cereals are doing well particularly wheat, there being scarcely any rust as yet. Oats promise a heavy crop. Algerian shows no sign of rust but the Cape variety is dead with that disease. Barley is doing well, also rye, and what lucerne there is looks healthy. Vines are flourishing. A great many American grafts are being planted here. Stock improving generally as the season advances. Cattle are doing well the calving season with a few exceptions, proving favourable. The creamery finds plenty of support and there is a good deal of individual butter making as well. Horses are scarce and mange is prevalent. Decent riding horses are running about £40, and draught animals range from £20 as high as £50. Mules run from £20 upwards. Sheep show up well and shearing is now in full swing. The clip promises to be a good one though scab is fairly prevalent. Lambs are not prospering so well. Cape goats and pigs are thriving.

Riversdale.—The rains came late this year and hardly any summer heat has been felt as yet. From the 1st of January to date 19.52 in. was registered at the local gaol. The veld everywhere is remarkably fine being covered with grass and flowers and could carry much more stock at present. Crops of all kinds promise well. Rust has shown itself in Medeah wheat which up to the present has been immune. Algerian oats are mostly sown. The sowing of oats this year has not been on so large a scale as last year. Oat-heaves of a very superior quality are raised in this district. Mealies are only just being put in. Lucerne does very well indeed. Am led to believe that the present will be a very trying year for rust owing to damp, and the prevalence of heavy fogs earlier in the year. All kinds of fruit are grown, but it has not yet been taken up as an industry. All citrus fruits suffer from red scale, and fumigation has not as yet been generally adopted. Apple trees suffer from wooly aphid and peach from white scale. Cape Vine stocks only are

planted. Vines look very well. Sulphuring for Oidium has already begun. The district is as yet free from Phylloxera. Cattle generally are in splendid condition, owing to the veld affording fine pasturage in consequence of heavy rainfall. September is the calving season, and a large number of calves will be reared this year. Cattle of all kinds are fetching very high prices. Dairying is carried on in the old-fashioned primitive style. Butter should be plentiful later on as the grass gets stronger. Slaughter stock is scarce owing to the larger, heavier and older animals having been sold to butchers. There is certainly a desire on the part of owners of breeding stock to improve the quality of animals reared by them. Stallions of good breed are rare. Young one year-old colts (ordinary) sell at about £20. Well-bred from imported stock yearlings fetch £45 and £50. Year old mules about £10. Owners of donkeys are not inclined to part with the young ones. All horses are sound, healthy and in good condition. The lambing season is satisfactory, and is now over. Sheep generally are scabby. Slaughter stock is scarce. Earlier in the year large numbers were sold to surrounding districts both for slaughter and breeding purposes. The condition of the goats in this district is satisfactory. Owners are now dipping chiefly for tick which is very prevalent at this time of year. Ostriches are doing very well. They run at this time of the year over the farms which in most cases are enclosed, and later on in lucerne camps. Large numbers of chicks were lost owing to incessant rains of September just as they were hatched. All farmers keep some pigs, but as an industry it has not yet been taken up.

Cathcart.—The heavy rains and snows of this season make it the wettest known for many years. September was very wet and October is bringing strong Northerly winds. The veld is excellent, but short; and there are no signs of locusts as yet. Wheat is doing fairly well but backward; the frost destroyed a few small patches. Oats are also doing well in spite of late sowing and a heavy crop is anticipated in some of the wards. Lucerne is not grown much in this district. The fruit season does not promise well, the frost having nipped most of it. Oxen are low in condition owing to heavy work and others are fairly well for the season. Dairying is carried on extensively in the district by individuals, but there is no creamery. Slaughter stock are in fair condition only, but good prices are obtainable, averaging about £20. Horses are generally in low condition unless stabled and mange is very prevalent. Prices range from £30 to £50. Sheep are in fair condition and the wool crops look promising. Unfortunately scab has been introduced from the Orange River Colony into some of the flocks and wire worm infects others.

Middelburg.—As a rule the veld is very dry in September and October but thanks to the early rains this year it is in very fair condition. High winds and hot weather prevailed at the beginning

of October but should rain fall again shortly as is anticipated an excellent season may be expected. Locusts have disappeared. Wheat and oats are looking well though not so much of the former was sown as usual. Nearly every farmer in the district grows lucerne and it is looking very well indeed though a little backward. Fruit has suffered by the frosts. Cattle are doing fairly well with few cases of disease, and the calving is promising. Dairying is growing in favour, the one creamery being well supported. Slaughter animals in fair condition realise excellent prices, but the majority are poor. Generally speaking horses are doing fairly well for the time of year, but influenza and strangles are prevalent in one ward. Decent animals average about £30. Sheep are doing fairly well and the wool is promising but scab is very prevalent. Slaughter stock scarce but doing well. Angoras are doing very well and a heavy clip is anticipated. Ostriches are also doing well with a promise of good pluckings. Baboons are troublesome.

Herschel.—Light rains and windy changeable weather mark the season, but the veld is very good for the time of year. Wheat looks well, oats are promising and mealies are fairly good, but there is very little lucerne cultivated. Frost has damaged the fruit in some places. Cattle are low in condition and rinderpest is here, but the calving season should be fairly up to the average. Horses scarce, poor in condition and mangy. Sheep are doing fairly well, slaughter stock being scarce. The lambing should equal the ordinary season. Angoras are doing fairly well and a medium clip is anticipated. Pigs are plentiful but poor owing to care and want of feeding.

Hopetown.—The season so far has been very dry in this district very little rain having fallen. Locusts have disappeared, however, and the veld, if anything, is better than usual at this time of year. Cereals are not much sown, the little wheat we have is looking well. Fruit promises well and though scarce is good. Cattle are doing fairly well with the promises of a good calving season, while slaughter stock being scarce realise good prices. Horses are poor and scarce, averaging from £25 to £40. Sheep are poor, generally speaking, and scab is prevalent. The wool clip is not promising. Ostriches are thriving and the plucking promises to be excellent. Pigs are scarce.

Fraserburg.—With very slight rainfall, in fact the driest season known for years in some parts of the division—and changeable weather alternately hot and cold, the prospects are not so bright. The rainfall for September was .87 compared to 1.37 for the same period last year. The veld is short for the time of year, but fairly good. No locusts have made their appearance as yet. Cereals are consequently not a heavy crop, but those that are grown look very well. Lucerne what little there is, looks very healthy and seems to thrive everywhere. Good fruit crops are anticipated. All stock are

suffering more or less from the drought, but there is very little sickness about. Cattle are doing fairly well, with a calving season on the whole, well up to the average. Horses and mules are poor, scarce, and expensive. Scab is prevalent among the sheep in some wards and in others the drought has carried off a few thousands. Those left are not doing over well. All goats do well here but Angoras are not plentiful. Ostriches, the few we have, seem to be thriving.

Tarka.—The September rains which were heavier than usual brought all vegetation on splendidly, but there has been no rain since and the country is beginning to feel the need of some. The season is well above the average and, if the rains fall, is full of promise. Wheat on dry lands is not looking so well though a good crop is expected. A good crop of oats is expected, large quantities having been sown but the want of rain is checking growth. Lucerne, where grown, has been of immense benefit to the farmers during the spring for lambs, but it is not by any means general. Fruit has mostly been killed off by the late frosts. It promised very well early in the season. Cattle are doing fairly well, good useful animals being scarce and expensive. They rule from £30 and £35 upwards. Sheep are in good condition for the season and the increase of lambs is satisfactory. Scab is noticeably prominent in some parts of the district. Slaughter animals are scarce and command the highest prices on record.

Hanover.—Rains are wanted badly in this district for both crops and stock as up to the present the season has been very dry. In fact it compares very unfavourably with last year. It is hot at the date of reporting (October 15) and cloudy with indications of rain. The veld is very fair, but withering fast for want of rain. Locusts are reported in Ward 2 in several large swarms making south-east. Cereal crops are looking fairly well but oats are not so heavily sown as last year. Fruit is doing well and an excellent crop is expected. Cattle are doing fairly but the calving was not so good as last year. Wool promises well, but scab is very prevalent. The flocks are doing fairly well. Angoras do well here, the kidding having been favourable. Ostriches are also doing well but the nesting was late on account of late rains.

Sutherland.—The season is fairly good but cold, the veld is good. Cereals are scarce but what little there is looks well. Fruit is promising. Cattle are in fair condition with a good calving season, slaughter animals command high prices. Horses, mules and donkeys scarce; prices high. Sheep are in fair condition, scab is plentiful and the wool below the average.

THE TRANSKEI.

Elliotdale.—Nice rains fell during the early part of September and a little ploughing resulted, but since then hot, dry and heavy winds have prevailed and the ground has become very hard. The pasturage, however, is good, and stock of all kinds are in good condition and free from disease. There are only three or four cases of scab in the District.

Kokstad.—During September very little rain fell, and the weather was rather dryer than is usual for the season of the year. However, the veld has retained its former healthy appearance. While in some of the more sheltered parts of the district good spring grass is growing in abundance. No diseases amongst cattle, horses, or goats have been reported and there is every reason to believe that stock in general is thriving throughout the district. Every hope is entertained for a prosperous season and farmers look upon the approaching Spring as the most promising they have anticipated for many years.

St. Marks.—There is very little to report on this subject for the past month. The natives are busily engaged in ploughing. Pasturage is plentiful, and stock, both large and small, are in very fair condition. No contagious diseases were reported during September.

Tsolo.—Very fair rains fell during the month of September and the pasturage is coming on rapidly. Very little if any ploughing however has been done, the people are waiting for the cattle to recover from the June blizzard and it is early for mealie sowing, although kaffir corn should be now in the ground. Stock of all kinds are recovering rapidly and a favourable season is anticipated. Strong winds prevailed during September, particularly on the 23rd, and a frost on the 26th. The latter however beyond scorching the tops of the potato crops did no harm to the fruit. The district is free of stock diseases.

Tsomo.—Rainfall at this station during the past month was 1.45 inches. Natives started ploughing their lands and sowing kaffir corn about the middle of September. An outbreak of Rinderpest was reported and infected herds were placed in quarantine and inoculated. The disease has not spread beyond the quarantined area. The origin of the outbreak has been traced to two cattle which were brought from Cala district in August last. Two outbreaks of Redwater occurred, and the infected cattle have been placed in quarantine. Stock on the whole is in very fair condition.

Idutywa.—In September we had good rains, the pasturage is very good, and all stock is improving in condition. A good deal of

ploughing has been done and the hope at present is that there will be good crops. The sheep however are almost all suffering from scab. The sheep Inspectors state that the cold rains which fell during June caused this, as up to that time the flocks were practically clean. Until such time as the kraals are thoroughly cleaned and disinfected the disease will it is feared remain. Of course the Natives are not able to expend the money it would cost to do this, but Government may be able to assist them as it did the Farmers in the Colony some six years ago.

Elliot.—A few nice showers of rain have fallen and the pasture is much improved. No new cases of Rinderpest have been reported since the 26th of August; the disease is well in hand; the district is still under quarantine.

Qumbu.—Ploughing operations are delayed as rain is needed. The pasturage however remains in good condition. One case of glanders occurred during the month. The animal was at once shot and the carcass buried by the owner on the suggestion of the Veterinary Department.

Nqamakwe.—The rainfall registered during September was 2.62 inches. Some very cold weather was experienced during the early part of that month, accompanied by heavy showers of rain. Pasturage is plentiful and stock in good condition. No cases of Lung-sickness have been reported. Rinderpest has not yet appeared in this district.

Xalanga.—There was scanty pasturage during September and all stock in poor condition. There have been a great many cases of mange in horses. Several cases of Rinderpest occurred in the early part of August but the disease now appears to be dying out. A little rain has fallen but not in sufficient quantity to do much good.

Umzimkulu.—Seasonable spring weather has much improved the grazing veld, and all stock is looking well for this time of year. The solitary case of Glanders has died out and no further outbreak has occurred. Rinderpest has broken out in Ixopo district Natal, within five Miles of our border, and 14 head are at present suffering from the disease on one farm. The outbreak has been duly brought to notice of Government and suggestions made as to action to be taken to prevent the spread of the disease to this territory, as the main road to East Griqual and passes through the quarantine area.

Butterworth.—No rains have fallen this month (October) but the pasturage is good and stock in good condition. Cultivation is being carried on the ground being still moist, the result of the copious rains earlier in the spring. There have so far been no locusts in this district this season.

Nqueleni.—As a result of the abundant rainfall during the early part of September the whole country is beautifully green, and consequently stock of all kinds are in a flourishing condition. A little ploughing was done, but the majority of the people are waiting for the later rains. The price of grain is high being about £1 to £1 5s. per bag.

Kentani.—During the past month a good deal of ploughing has been done but owing to fear of the worm the Natives are delaying putting in their main crop of mealies until next month. The lands already ploughed have been sown chiefly with Kaffir Corn. Owing to recent good rains the pasturage is in splendid condition and stock generally speaking is looking well. One case of Anthrax in cattle is reported and the cattle quarantined, but as yet no further outbreak.

Mqanduli.—There is nothing to report beyond a scare of Rinderpest along the Xora River. One beast had died of Gall-sickness and at a neighbouring kraal a hieffer took sick and its symptoms were puzzling. Ten days later the beast died and on examination the cause of death was found to be a growth or tumour in the intestines. Gall-sickness has appeared at Qokolweni and Ngwara otherwise stock of all kinds are in good condition and rapidly increasing. A little wheat sown amongst the more progressive natives looks promising but otherwise the lands are vacant. Ploughing on account of rains fallen should be in good time.

Willowvale.—The copious rains that fell during the early part of last month put the plough in motion especially along the coast, and veld and stock are much benefited. So far, this district is still free from Rinderpest and other contagious diseases.

Tabankulu.—September was characterised by very varied weather, ranging from hot winds to slight frost. The absence of rain retarded growth of all kinds, though the veld is coming on grandly. Stock is in good condition and no disease reported.

Bizana.—Nice rains fell during September and the pasture, which has never been really bad during the winter, is now in first rate order. In some parts the rain has been sufficient for ploughing to commence.

Libode.—During the early part of September several heavy showers of rain visited the district thus enabling the Natives to commence their ploughing operations rather earlier in the season than is generally the case. In many parts the mealies are several inches above the ground so that there is evidently a prospect of a good number of early crops in the district. Stock of all kinds are looking in splendid condition but there are still a large number of small stock badly affected with scab. The new pasturage is at present in an abundant and luxurious condition.

Lusikisiki.—An outbreak of glanders took place some weeks ago among the horses of Messrs. Kilroe Bros., Post Contractors. The stable, consisting of nine horses, was promptly quarantined and the horse infected was destroyed. Government are taking steps to have all the horses along the line tested by Mallein, the want of a qualified man to perform the operation has caused a considerable delay. Horses and cattle are otherwise in a flourishing condition.

Mount Fletcher.—High winds prevailed here during September with no rain worth mentioning. The natives have, notwithstanding, commenced ploughing, the ground being still damp from the snow fall in June. The veld is green and quite sufficient for stock of all sorts. No disease has been reported during the month amongst stock which is in fair condition.

Flagstaff.—We had a few light showers during September and some of the natives are beginning to plough. The pasturage at present is excellent and stock are in good condition. The district is free from all diseases among stock. The natives are making very anxious inquiries about the rumoured approach of Rinderpest. Should this disease actually make its appearance in this district, I do not consider the natives will need much pressure to inoculate as some of them are already anxious to begin.

Mount Ayliff.—The general condition of the veld is satisfactory, but there is a great need of rain. The rainfall during September was insignificant, and the grass which has come on nicely up to the present is beginning to feel the want. For the same reason the ploughing season is delayed and this is causing a certain amount of anxiety. There is only one area under quarantine for lungsickness. Stock otherwise is very healthy.

St. Johns.—In parts of the district light rains fell during September enabling the Natives to break up ground for this season's sowing. Stock of all kinds are healthy and in good condition.

Mount Frere.—High winds prevailed during the most part of September, and very little rain has fallen. No ploughing has yet been done. Stock has improved in condition, and Lungsickness is on the decrease, very few areas now remaining infected. Rinderpest has not yet broken out in the district. There are a few cases of scab amongst sheep.

Matatiele.—Owing to a scanty rainfall during September very little ploughing has been done. The veld, however, has improved a great deal and stock are in better condition. No diseases were reported.

ARTIFICIAL MANURES.

The annexed list showing the agents from whom the various artificial manures may be obtained, and the current prices, is published for the information and guidance of agriculturists.

Full particulars as to the composition of the respective fertilizers can be obtained on application to the agents; and attention is also invited to the analyses published in the *Agricultural Journal* of 9th January, 2nd April and 11th June, 1896; 30th Sept., 1897; 27th Oct., 1898; 13th April, 6th July, 1899 and 18th July, 1901.

LIST OF FERTILIZERS.

Attwell & Co., Cape Town. (Agents for Alex. Cross & Sons, Ltd., Glasgow.)	Special Root Guano	..	£6	10	0	per ton of 2,000 lb.
	Potato and Grain Guano	..	8	5	0	" "
	Nitrate of Soda	..	12	0	0	" "
	Superphosphates 39/40 per cent.	..	6	0	0	" "
	Scotia Basic Slag (cont. 30 per cent. Tribasic Phosphate of Lime)	..	4	15	0	" "
	Sulphate of Ammonia	..	0	19	6	per 100 lb.
(Prices free on trucks, Cape Town)						
Jas. Searight & Co., Cape Town.	No. 1 Superphosphates	..	£5	0	0	per ton of 2,000 lb.
	(containing 12·14 per cent. Phosphoric Acid soluble in water, being equal to 26·30 per cent. Tribasic Phosphate of Lime).	..				
Jas. Searight & Co., Cape Town.	No. 2 Superphosphates	..	5	10	0	" "
	(containing 14·16 per cent. Phosphoric Acid soluble in water, being equal to 30·35 per cent. Tribasic Phosphate of Lime).	..				
	No. 3 Superphosphates	..	£6	0	0	per ton of 2,000 lb.
	(containing 17·18 per cent. Phosphoric Acid soluble in water, being equal to 37·39 per cent. Tribasic Phosphate of Lime).	..				
	Vine Fertilizers	..	9	0	0	" "

A reduction of 5s. per 2,000 lbs. is allowed on orders of 100 bags or more. Special rates can be arranged if delivery is taken ex importing steamer, the goods being trucked at Docks.

Woodhead, Plant & Co. Cape Town.	Thomas' Phosphate Powder	£4	15	0	per ton of 2,000 lb.
	Superphosphates	5	15	0	
	Nitrate of Soda	14	0	0	
	Muriate of Potash	16	0	0	
	Sulphate of Potash	16	0	0	
	Wheat Fertilizer	8	10	0	
	Kainit ..	4	15	0	
	Potato ..	1	15	0	per 200 lb.
	Vineyard Manure	1	15	0	"
	Tobacco Manure	1	15	0	"
	Sulphate of Ammonia	1	2	6	per 100 lb
Subject to a discount for cash.					
De Waal & Co., Cape Town.	Jadoo Fibre ..	..	10s.	6d.	per bale of 100 lb.

White, Ryan & Co., Cape Town.	Potato, Vegetable and General garden	£8 10s. per ton of 2,000 lb. If less than $\frac{1}{2}$ ton 18s. 6d. per bag of 200 lb.
	Pure Ground Bone	£6 10s. per ton of 2,000 lb. If less than $\frac{1}{2}$ ton 13s. 6d. per bag of 200 lb.
White, Ryan & Co., Cape Town.	Quick-acting Bone and Potash Mixture	£7 per ton of 2,000 lb. If less than $\frac{1}{2}$ ton 16s. per bag of 200 lb.
	Selected Bone Meal for Cattle, Horses, Pigs and Poultry ..	15s. 6d. per 100 lb.; special price per ton.
	Bone Grit for Fowls	12s. 6d. per 100 lb.
Malcomess & Co., E. London.	Superphosphates	Wholesale only.
	"Malcomess" A. Fertilizer, for Potatoes, Mealies, Vegetables, Orange and other trees ..	£9 per ton of 2,000 lb.
	"Malcomess" B. Fertilizer, for cereals, especially wheat ..	£9 per ton of 2,000 lb.
	Accompanied by guaranteed analysis by Prof. Hahn ..	(less 5 per cent for cash).
James Flower & Sons, Cape Town.	"H.B.T." Gypsum	£3 10s. per ton of 2,000 lb.
	Pure Ground Bone Meal ..	£8 10s. (in bags f.o. trucks—Cape Town).
Government Guano:—	Ordinary Guano	£6 10s. per ton of 2,000 lb. or 13s. per bag of 200 lb.
	Rock Guano	£6 17s. per ton of 2,000 lb. or 18s. 9d. per bag of 200 lb.

For use within limits of Colony.

Price includes delivery at Cape Town Railway Station.

D. E. Hockly & Co., East London.	"Hockly's Special Fertilizer." A complete manure for all crops	} £9 per ton of 2,000 lb. less 5 per cent for cash. Special Price
	Pure Bone Meal	
J. G. Steytler & Co., Cape Town.	Phosphates or Basic Slag	£1 2 6 per ton of 10 bags each 200 lb.
	Superphosphates ..	4 12 6
	Dissolved Bone ..	6 7 6
	Grain Fertilizer ..	7 0 0
	Potato Fertilizer ..	8 0 0
Henry Ries & Co. East London.	Vine Fertilizer ..	8 0 0
	Agents for the Lawes Chemical Manure Co., Ltd., of 59, Mark Lane, London, who prepare fertilizers for them, which they sell at the undermentioned rates:—	
	Ries' Potato Fertilizer	15s. to 17s. 6d. per bag of 200 lb.
	„ Special Dissolved Bone	8s. 6d. to 10s. „ of 100 lb.
	„ Special Cereals Manure	8s. 6d. to 10s. „ of „
	„ Ordinary	7s. 6d. to 9s. „ of „

For the potato fertilizer they make a reduction of 1s. 6d. per bag on orders for 10 to 25 bags, 2s. on orders for 30 to 50 bags, and 2s. 6d. on orders for 50 to 100 bags. For the other three lines they make reductions of 6d., 1s. and 1s. 6d. per bag respectively on orders for 10 to 25, 30 to 50, and 50 to 100 bags. Analysis guaranteed as per list.

THE PRODUCE MARKET.

CAPE TOWN.

Messrs. Wm. Spilhaus and Co. report under date, October 25th, as follows :—

Ostrich Feathers.—There was again a moderate quantity offered on our local sale this week. We are pleased to report that a better tone prevailed, and we may make prices firmer, especially noticeable in blacks and drabs. Business for the day: 1,292 lb., which realised £1,900. We quote :

	£	s.	d.	£	s.	d.		£	s.	d.	£	s.	d.
Whites (primes)	10	10	0	15	0	0	Blacks (Long) ..	4	0	0	6	0	0
Firsts ..	7	10	0	10	0	0	Long Medium	2	10	0	3	10	0
Seconds ..	5	10	0	6	10	0	Medium ..	1	0	0	1	10	0
Thirds ..	3	10	0	4	10	0	Short ..	0	5	0	0	10	0
Inferior and stalky	1	10	0	2	0	0	Long Floss ..	1	5	0	1	10	0
Byocks ..	4	10	0	6	0	0	Medium Floss	0	7	6	0	10	0
Feminas (super)	6	10	0	8	10	0	Short Floss ..	0	2	6	0	5	0
Firsts ..	4	10	0	5	10	0	Drabs (Long) ..	2	5	0	3	5	0
Seconds ..	3	0	0	4	0	0	Long Medium	1	5	0	1	10	0
Thirds ..	2	0	0	2	10	0	Medium ..	0	10	0	1	0	0
Inferior ..	0	10	0	1	0	0	Short ..	0	2	0	0	4	0
Dark ..	3	10	0	5	0	0	Long Floss ..	1	5	0	1	10	0
Spadonas (White)	1	10	0	2	10	0	Medium ..	0	5	0	0	10	0
Light and Dark	0	10	0	1	0	0	Short ..	0	2	0	0	3	0
Boos (White) ..	1	0	0	1	10	0	Inferior Long						
Light ..	0	17	6	1	5	0	Blacks & Drabs	0	15	0	1	0	0
Black Butts ..	0	7	6	0	10	0	Floss ..	0	4	0	0	5	0
Dark ..	0	7	0	0	10	0	Wiry ..	0	0	6	0	0	6
Inferior ..	0	3	0	0	5	0	Chicks ..	0	0	6	0	1	0

Wool.—A sale of part of the Darling wools was held on Tuesday; competition on these was very keen, and high prices were obtained. Mr. F. Duckitt's wool again fetched the top price of 8½d. per lb. On yesterday's sale mostly Karoo wools were offered. Superior parcels for combing sold at from 6½d. to 6½d. Ordinary fetched from 5½d. to 6d. per lb. We make prices easier with restricted competition. We quote Karoo grease for combing, 5½d. to 6½d. per lb.; Karoo grease for scouring, 4½d. to 5½d. per lb.; snow-whites, ordinary, 1s. 0½d. to 1s. 1½d. per lb.; snow-whites, super, 1s. 2½d. to 1s. 4½d. per lb.; snow-whites, extra super, 1s. 5d. to 1s. 5½d. per lb.

Skins.—Our quotations are unchanged for merinos, but Cape skins we can quote 1d. higher. We quote. Merino long wools, 5½d. per lb.; merino short wools, 4½d. per lb.; pelts, 3½d. per lb.; bastards, 3½d. per lb.; goatskins (sound), 10d. per lb.; sundried, 6d.; scurvy, 6d. each; Angoras, 4d. per lb.; pelts, 3d. per lb.; Capes, 1s. 10d. each; cut, 1s.; damaged, 6d. each; other descriptions according to quality.

PORT ELIZABETH.

Messrs. John Daverin & Co., of Port Elizabeth report under date, October 17 :—

Ostrich Feathers.—The market was well supplied this week with the usual average assortment. Competition was active, especially on Tuesday, when prices showed some advance on those current last week.

The total value of Feathers sold on the public market this week amounted to £7,784 15s. 4d., and weighed 4,210 lbs. 9½ ozs.

We quote the following as current prices for :—

	£	s.	d.	£	s.	d.		£	s.	d.	£	s.	d.
Primes Good to							Blacks Long	3	10	0	6	0	0
super ..	12	0	0	18	0	0	Medium ..	1	5	0	2	10	0
Whites Firsts	0	0	0	10	10	0	Short ..	0	5	0	0	15	0
Seconds	5	15	0	7	10	0	Wirey ..	0	0	6	0	1	0
Thirds	3	10	0	5	10	0	Floss ..	0	5	0	1	7	6
Feminas Tipp							Drabs Long	2	0	0	3	5	0
and Grey	5	10	0	9	10	0	Medium ..	0	15	0	1	15	0
Seconds	2	15	0	4	10	0	Short ..	0	1	6	0	5	0
Thirds	1	5	0	2	10	0	Wirey ..	0	0	6	0	1	0
Fancy	4	10	0	7	0	0	Floss ..	0	5	0	1	7	6
Tails White	1	2	6	1	10	0	Spadonas Light	1	5	0	2	10	0
Light	0	15	0	1	0	0	Dark ..	0	12	6	1	10	0
Coloured & Dark	0	4	0	0	12	6	Chicks ..	0	0	3	0	1	6

Wool.—This market continues very firm, and a fair amount of business has been done in the open market during the week at full prices. On the public market yesterday many lots with length and quality excited good competition, but short, wasty, and unsightly Wools were neglected and brought low prices. We quote:

Snowwhite Extra ..			Grease, Short, faulty		
Superior ..	16d	16½d	and wasty ..	4½d	4½d
Snowwhite Superior ..	15d	15½d	(Grease, Coarse and		
Do Good to Superior	14d	14½d	Coloured ..	2½d	3d
Do Inferior Faulty	12½d	13½d	Scoured, Coarse and		
Grease, Super Grassveld	6½d	7d	Coloured ..	5½d	8d
Do Karoo ..	5½d	6d	Free State Grassveld		
Do Mixed Veld	5½d	6½d	Grease, long ..	5½d	5½d
Grease Light, faultless,			Free State medium		
medium Grassveld ..	5½d	6d	grown, light, ..	5d	5½d
Grease, Light, faultless,			Free State short, faulty		
medium Karoo ..	5½d	5½d	and wasty ..	4½d	4½d
Grease, Light, faultless,			Free State Karoo, long	5d	5d
medium short Karoo	5½d	5½d			

Mohair.—There is a limited demand for Winter Hair at 9d to 9½d, and 12½d to 13d for Kids, and several sales have been made at these prices. For Summer Firsts and Kids there is at present no enquiry, and no sales have been made during the week. We quote:

Kids, superfine ..	1s	7d	1s	8d	Mixed Free State Hair	0s	8½d	0s	9½d
Superior Clips ..	0s	10½d	0s	11d	Seconds and Grey ..	0s	6d	0s	8d
Ordinary Clips ..	0s	9½d	0s	10d	Thirds ..	0s	4d	0s	4½d
Long Blue Free State					Winter ..	0s	9d	0s	9½d
Hair ..	0s	10d	0s	11d	Do Kids ..	1s	0d	1s	1d

Skins.—We sold Sheepskins this week at 5½d in bundles; Pelts, 3½d, Capes, 1s 2½d; damaged, 5½d each; Angoras, 5½d; Shorn, 4½d; damaged, 2½d; Goat, 11½d; damaged, 5½d per lb; Springbok, 9d each.

Hides.—We sold this week sundried Hides at 7½d, and for damaged 5½d; Drysalted 6½d and Thirds 4d.

Horns.—We sold parcels all round at 4½d each.

EAST LONDON.

The East London Dispatch reports under date October, 17th:—

Wool.—While the general tenor of mail advices shows nothing of any moment as affecting the position, still some operators appear less keen on following the market at prices now ruling. As however statistically the position is sound, it is not anticipated there will be much, if any, weakness in prices in the more immediate future, provided sellers continue to meet the market for fine wool. Locally there has not been any large quantity of wool dealt in, owing to arrivals of the new clip being still very small, while from old stocks buyers are holding aloof unless at lower rates than sellers are prepared to accept. Comprised in the total of some 200 bales that have changed hands this week are a few Komgha clips, medium to long wool, quitted at 6½d. to 6¾d., and short 6½d. rather earthy. Kei Road wools have made, for short 6¾d., and long up to 7½d. Transkei greases have been dealt in at 5½d. per lb and Basuto wools (last seasons) at 5d. Queenstown style of long wool made 6d. It is as yet rather early to comment on the condition of the new clip. Still, what has come in is rather more earthy than was anticipated.

Mohair.—Locally a few bales of fine hair have changed hands on the basis of 11d. for firsts. Other qualities, however, remain out of request at prices wanted by up-country consignors.

Hides.—With freer receipts more could be done, particularly in sun dried hides, for which enquiry is fairly general, outside rates being readily paid for these on arrival. Dry salted hides are barely so firm. We quote: sun dried hides, 6½d. to 6¾d.; dry salted, 5½d. to 6½d.; wet, 4½d. to 4¾d.

Skins.—At from 5d. to 5½d. per lb. for fair average parcels of woolled skins the market is fairly steady, goat-skins sell at 10d. to 10½d., Angoras sound at 5d. to 5½d.; damaged at 4d. to 5d. each.

GOVERNMENT NOTICES.

Farmers' Apprentices. Dairy Assistants, &c.

As inquiries are from time to time received from young men from abroad as to where they may serve apprenticeship or gain practical experience of farming in this Colony, before starting on their own account, the Secretary for Agriculture invites Farmers who are willing to receive young men of good character, for this purpose, to register their names with the Under Secretary for Agriculture, stating the class of farming they do, how many young men they are prepared to take, and for what period they would enter into an agreement.

It is not probable that these young men will be in a position to give more than their free services in return for the experience they will gain; that is, they will not be able to pay any fee; and they will look to receiving free board and lodging in return for their services.

It is to Farmers, therefore, who are willing to grant such young men free board and lodging in return for services rendered, that this application is especially addressed.

With reference to the above notice to Farmers, the Secretary for Agriculture now invites young men who are willing to engage themselves as Farmers' Apprentices in Cape Colony to register their names with the Under Secretary for Agriculture, Cape Town. The apprentice will gain experience in farming in South Africa, and have an opportunity for spying out the land before starting on his own farm. To the new comer from another country this is essential, for he has much to learn and unlearn.

Many applications for such Apprentices have been received from Farmers in the Colony. It will be noted that the Apprentice will neither receive wages, nor pay a fee. He will get free board and lodging in return for his services, and at the same time acquire the experience he is in need of.

Applications for employment have also been received from several Lady Dairy Experts and Dairy Assistants; and Dairy Farmers and others desiring to avail themselves of the services of such are invited to register their names with this Department, giving particulars as to situation and extent of operations, etc. and salary and other emoluments they are prepared to offer.

The Outbreak of Rabies.

By command of H.E. the Governor the following Proclamation No. 163 of September 4th, 1902 is published in the *Government Gazette*.

Under and by virtue of the powers and authorities vested in me by Act No. 27 of 1893, entitled the "Animal Diseases Act 1893," I do hereby proclaim, declare and make known that whereas it has been represented to me that the disease known as RABIES is prevalent among Dogs in Southern Rhodesia the introduction of all Dogs and other Carnivora and Monkeys from Southern Rhodesia or from the Bechuanaland Protectorate into this Colony shall be and is hereby prohibited, and that all Dogs and other Carnivora and Monkeys which may enter or be introduced into this Colony in contravention of this Proclamation shall be liable to be destroyed.

And I do hereby declare that this Proclamation shall have effect from and after the date hereof, and shall continue in force until amended or repealed.

And I do strictly charge every Resident Magistrate, Field-cornet and Justice of the Peace to see that this Proclamation is obeyed, and to bring to justice any person who may contravene the same.

Cattle from German South-west Africa.

By Command of H.E., the Governor, the following Proclamation, No. 122 of 1901, is published:—

Under and by virtue of the powers vested in me by Act No. 47 of 1898 and Act No. 2 of 1897, I do hereby proclaim, declare and make known that notwithstanding anything contained in the Proclamation, No. 18, bearing date January 21, 1901, it shall and may be lawful, from and after the date hereof, to introduce Horned Cattle into this Colony from that portion of the Territory of German South West Africa, which lies south of the Quarantine Belt established by the Government of the said Territory at about the 24th parallel of South Latitude, subject to the Regulations contained in the Schedule hereto.

GOD SAVE THE KING.

Given under my hand and the Public Seal of the Colony of the Cape of Good Hope, this 15th day of July, 1901.

WALTER HELY-HUTCHINSON,
Governor.

By Command of His Excellency the Governor in Council,
P. H. FAURE.

Schedule to foregoing Proclamation..

(1). The person in charge of the cattle introduced under this Proclamation shall obtain and have in his possession a certificate in the form set forth in Annexure "A" hereto, issued and signed by a competent and responsible Officer or person delegated for this purpose by the Government of German South West Africa.

(2) The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, to any Field-cornet, Police Officer or owner of land which the cattle may pass or be passing.

(3) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding Fifty Pounds Sterling, or in default of payment to imprisonment with or without hard labour for any period not exceeding Three Months unless such fine be sooner paid.

ANNEXURE "A."

I do hereby certify that the undermentioned cattle have not come from a locality north of the Quarantine Belt established by the Government of German South West Africa about the 24th parallel of South latitude, nor from a locality in which contagious disease is known to exist, and that they are free from disease, viz:—

Number and general description)
of cattle and place from
which sent.)

Owner's name and address.

Name of person in charge.

Place in Cape Colony to)
which cattle are being sent.)

Signature of Official of German
Government.

Title

Place

Cattle from Queensland, United States of America and Argentina.

REGULATIONS FOR IMPORTATION.

By command of His Excellency the Governor, the following Proclamation No. 138, 1902, is published in the *Government Gazette* :—

Under and by virtue of the powers and authorities vested in me by the provisions of Act No. 27 of 1893, entitled "The Animal Diseases Act, 1893," I do hereby proclaim, declare and make known that, in terms of Section 6 and 7 of the Act aforesaid, I have issued and do hereby issue the following Regulations, as set forth in the Schedule hereunto annexed, regarding the importation or introduction of cattle into this Colony from the State of Queensland (Australia), the United States of America and Argentina.

And I do hereby declare that these Regulations shall have effect from and after the 1st September, 1902, and shall continue in force until amended or repealed.

Schedule to foregoing Proclamation.

REGULATIONS REGARDING THE IMPORTATION OF CATTLE FROM QUEENSLAND, UNITED STATES OF AMERICA AND ARGENTINA.

1. Cattle from the abovementioned countries may be landed at the Ports of East London and Port Elizabeth, subject to inspection and issue of Clean Certificate at such port as provided by law.

2. Such Cattle may also be landed at the Ports of Cape Town and Mossel Bay, provided they are accompanied by a Certificate in the subjoined form.

CERTIFICATE.

I do hereby certify that the undermentioned cattle are free from disease, and have not come from a locality in which the disease known as Redwater, Texas Fever, Tick Fever, or Tristeza is indigenous, and in which healthy cattle from non-infected areas are liable to become infected with the said disease.

Number and general description of cattle.....

Place from which cattle have come.....

Name of consignee at Cape Town or Mossel Bay.....

Signature*.....

Title..

Place

Date.....

Redwater in Rhodesia.

PROHIBITION OF INTRODUCTION OF CATTLE FROM SOUTHERN RHODESIA.

By command of His Excellency the Governor the following Proclamation No. 139, 1902, is published in the *Government Gazette* :—

Whereas the disease known as Redwater is prevalent amongst cattle in Southern Rhodesia:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of cattle from Southern Rhodesia into any part of this Colony shall be and is hereby prohibited, and that all cattle which may enter this Colony in contravention of this Proclamation shall be liable to be destroyed.

And I hereby declare that this Proclamation shall have effect from and after the date hereof, and shall continue in force until amended or repealed.

And I do strictly charge every Resident Magistrate, Field-cornet and Justice of the Peace to see that this Proclamation is obeyed, and to bring to justice any person who may contravene the same.

*To be signed by an Officer specially authorized to perform the duty by the Government or State Administration of the country from which the cattle are shipped.

Prohibition of the Importation of Grass Hay from Southern Rhodesia.

By Command of H.E., the Governor, the following Proclamation, No. 166, of September, 10th, 1902, is published in the *Government Gazette* :—

Under and by virtue of the powers and authorities vested in me by Act No. 9 of 1876, intituled "Act to regulate the introduction into this Colony of articles or things which by reason of disease or otherwise might be injurious to the interests thereof," I do hereby proclaim, declare and make known that whereas the infection of Redwater may be conveyed by means of Grass Hay, the importation of Grass Hay from Southern Rhodesia, or from the Bechuanaland Protectorate, shall be and is hereby prohibited; and that all Grass Hay which may enter or be introduced into the Colony in contravention of this Proclamation shall be liable to be destroyed.

And I do hereby declare that this Proclamation shall have effect from and after the date of publication hereof, and shall continue in force until amended or repealed.

And I strictly charge every Resident Magistrate, Field-cornet and Justice of the Peace to see that this Proclamation is obeyed, and to bring to justice any person who may contravene the same.

Rinderpest Regulations.

The following Regulations have been proclaimed by H.E. the Governor under Act No. 2, 1897. (The Animals Diseases Rinderpest, Amendment Act, 1897.) :—

PROCLAMATION, No. 151, AUGUST 23RD, 1902 :

It shall not be lawful for public sales of horned cattle to be held in the District of Wodehouse.

PROCLAMATION, No. 152, AUGUST 23RD, 1902 :

1. From and after the date hereof it shall not be lawful to remove from any portion of the District of Wodehouse into the adjoining Districts of Queen's Town and Glen Grey any horned cattle or the carcasses, hides, biles or any other portions of such cattle.

2. Any person contravening the provisions of this my Proclamation shall, on conviction, be liable to forfeit any sum not exceeding one hundred pounds (£100) sterling, and in default of payment thereof to imprisonment with or without hard labour for any period not exceeding six months, unless the fine be sooner paid.

3. And I do strictly charge every Resident Magistrate, Field-cornet, Justice of the Peace, and Inspector of Native Locations to see that this Proclamation is obeyed, and to bring to justice any person who may contravene the same.

PROCLAMATION, No. 162, SEPTEMBER 4TH, 1902 :

Under and by virtue of the powers in me vested by the Animal Diseases Act No. 27 of 1893, and the Animal Diseases Rinderpest Amendment Act No. 2 of 1897, I do hereby proclaim, declare and make known that, owing to the existence therein of the disease amongst cattle known as Rinderpest, the areas named in the Schedule hereto shall be deemed to be areas infected with Rinderpest, from which areas, it shall not be lawful, from and after the date hereof, to remove into the Transkeian Territories any horned cattle or the carcasses, hides, biles or any other portions of such cattle.

Any person contravening the provisions of this my Proclamation shall, on conviction, be liable to forfeit any sum not exceeding one hundred pounds (£100) sterling, and in default of payment thereof to imprisonment with or without hard labour for any period not exceeding six months, unless the fine be sooner paid.

And I do strictly charge every Resident Magistrate, Field Cornet, Justice of the Peace, and Inspector of Native Locations to see that this Proclamation is obeyed, and to bring to justice any person who may contravene the same.

Schedule to foregoing Proclamation.

Districts of Barkly East, Glen Grey and Wodehouse.

PROCLAMATION No. 179, SEPTEMBER 22ND, 1902:

District of Taungs. Taungs Native Reserve.

Boundaries :—Bounded on the east by the Transvaal Colony and the farms Kopje Enkel, Home Rule, Killarney and Pudomer, on the north by the farms Verona, Stukfontein, Dwaalvlakte and Klipplaat, on the west by the farms Kgantsang, Kang, Maria Moet, Kankaro and Vaalbult, on the south by Griqualand West and farms Thoming, Hartington, Middlepark, Laseby, Rockdale, Lowestoft, Broadlea, Frisco, Sunbury and Blackpool.

PROCLAMATION No. 204, OCTOBER 20TH, 1902:

It shall not be lawful for Horned Cattle to be removed by rail or road from any place in the Districts of Barkly West, Hay, Herbert, Kimberley, Mafeking, Taungs and Vryburg to any place South of the Orange River.

PROCLAMATION No. 164, SEPTEMBER 8TH, 1902:

It shall not be lawful for public sales of horned cattle to be held in the Districts of Albert, Aliwal North, Barkly East, Herschel and Elliot.

PROCLAMATION No. 173. SEPTEMBER, 15TH 1902:

It shall not be lawful for Horned Cattle, in the Districts of Aliwal North, Barkly East, Glen Grey, Herschel and Wodehouse, to be removed beyond the limits of the respective Districts or, except upon the written permission of the Resident Magistrate of the District, from place to place within those Districts.

Rinderpest.

COMPULSORY INOCULATION.

By command of His Excellency the Governor, the following Proclamation No. 103, 1902, is published in the *Government Gazette* :—

Under and by virtue of the powers and authorities vested in me by the provisions of Act No. 2 of 1897, entitled "The Animals Diseases Rinderpest Amendment Act, 1897," I do hereby proclaim, declare and make known that I have issued and do hereby issue the following Regulations, as set forth in the Schedule hereunto annexed, for arresting the spread of Rinderpest.

And I do hereby further proclaim and make known that any person contravening any of the said Regulations shall be liable to a fine not exceeding fifty pounds, or in default of payment thereof to imprisonment with or without hard labour for any period not exceeding three months, unless such fine be sooner paid.

Schedule to foregoing Proclamation.

1. When Rinderpest has either already appeared or hereafter appears in any part of this Colony, all cattle which are infected with the disease or which may be in contact with infected cattle shall be forthwith inoculated either with serum or with glycerinated bile.

2. The inoculation shall be performed by the owner or person in charge of the cattle, or if he fail to do so, by a duly authorized officer of the Government, and the cost of the inoculation shall be borne by the owner or person in charge of the cattle.

3. No person shall, without the special permission of the Secretary for Agriculture, perform inoculation against Rinderpest with the pure bile or with virulent blood of animals affected with Rinderpest.

Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined Regulation for checking the spread of the infection is republished.

REGULATION ISSUED UNDER PROCLAMATION No. 30, DATED 20TH JANUARY, 1899.

Whenever under the provisions of Sections 11 and 12 of Act No. 27 of 1893, any area is declared or proclaimed to be an area infected with Rinderpest, it shall not be lawful for any person, animal, animal produce, article or thing, who or which may, in the opinion of the Magistrate of the District in which such area is situated, be liable to convey infection of Rinderpest, to leave or to be removed therefrom.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM BASUTOLAND.

By command of His Excellency the Governor the following Proclamation No. 63, 1902, was published in the *Government Gazette* of April 22nd, 1902 :—

Under and by virtue of the powers vested in me by the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," and the Act No. 2 of 1897, entitled the "Animal Diseases Rinderpest Amendment Act, 1897," I do hereby proclaim, declare and make known that, whereas the disease known as Rinderpest is prevalent amongst cattle in Basutoland, it shall not be lawful, from and after the date hereof, to introduce or to cause or allow Horned Cattle to be introduced from Basutoland into any part of this Colony, save and except cattle in yoke and accompanied by a certificate, to be obtained and held by the person in charge of such cattle, signed by a competent and responsible officer, to the effect that such cattle are free from infectious or contagious disease and have not been in contact with infected animals or come from a locality where any such disease shall be known to exist.

And I do hereby proclaim and make known that all Horned Cattle which may enter this Colony in contravention of this Proclamation shall be liable to be destroyed.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM ORANGE RIVER COLONY AND THE TRANSVAAL.

By command of His Excellency the Governor, the following Proclamation No. 139 1901, was published in the *Government Gazette* of August 16th, 1901 :—

Under and by virtue of the powers vested in me by the "Animal Diseases Act," No. 27 of 1893, and by the "Animal Diseases Rinderpest Amendment Act," No. 2 of 1897, I do hereby proclaim, declare and make known that it shall not be lawful, from and after the date hereof, to introduce or to cause or allow Horned Cattle to be introduced into any part of this Colony from the Orange River Colony and the Transvaal, save and except such cattle as may be required to be introduced by the Government for the purpose of supplying Bile or Serum for inoculation against Rinderpest:

And I do hereby proclaim and make known that all Horned Cattle which may enter this Colony in contravention of this Proclamation shall be liable to be destroyed

And I do hereby further declare that this Proclamation shall have effect from and after the date hereof, and shall continue in force until amended or repealed.

Proclamation No. 217, bearing date the 29th day of October, 1900, together with the regulations issued thereunder, is thereby repealed.

And I do strictly charge every Resident Magistrate, Field-cornet and Justice of the Peace to see that this Proclamation is obeyed, and to bring to justice any person who may contravene the same.

Locust Disease Fungus.

The attention of landowners and others is drawn to the provisions of Government Notice No. 1123 of 1897, wherein it is notified for general information that supplies of Locust Disease Fungus may be obtained from the Director of the Bacteriological Institute, Graham's Town, at a cost of sixpence per tube to all applicants residing in the Colony. Applicants beyond the borders of the Colony are required to pay the cost of postage in addition to the amount charged.

As the Fungus is cultivated on a moist jelly and is therefore liable to become dried up and useless if kept long on hand, it is not found possible to store supplies in the various districts of the Colony; and applicants desirous of trying the Fungus should therefore submit their applications, with a remittance for the quantity applied for, *direct* to the Director, who can always supply the Fungus in proper condition and on short notice.

Lung-Sickness.

INTRODUCTION OF CATTLE FROM OVER THE ORANGE RIVER.

By command of His Excellency the Governor, the following Proclamation was published in the *Government Gazette* of the 30th October, 1900:—

Whereas by virtue of the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," it is enacted that it shall be lawful for the Governor by Proclamation in the *Gazette*, to prohibit the importation or introduction into this Colony from any place beyond the same in which any infectious or contagious disease affecting animals shall be known or be supposed to be prevalent, of any such animals as in such Proclamation shall be mentioned

And whereas the disease known as Lung-sickness (Pleuro-pneumonia) is prevalent amongst cattle in the Transvaal and the Orange River Colony:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of Cattle from the Transvaal and the Orange River Colony, save by road by way of Aliwal North, Bethulie Bridge or Norval's Pont, and subject to the regulations set forth in the Schedule hereto, shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Schedule to the foregoing Proclamation.

(1) No cattle shall be introduced into this Colony from the Transvaal or the Orange River Colony by railway.

(2) No cattle shall be introduced into this Colony from the Transvaal and the Orange River Colony by road,

(a) Unless the person in charge of such cattle shall have obtained and have in his possession a certificate with regard to such cattle, in the form set forth in Schedule A hereto, signed by a competent and responsible officer or person delegated for this purpose by the Government of the Transvaal or the Orange River Colony, and

(b) Unless such certificate shall have been countersigned or endorsed by the Inspector appointed for this purpose by the Colonial Government at Aliwal North, Bethulie Bridge, or Norval's Pont.

(3) No person intending to introduce cattle from the Transvaal or the Orange River Colony, shall be permitted to introduce such cattle unless he shall have obtained the aforesaid endorsement, and he shall, with that view, give timely notice to the Inspector, stating the number of cattle and the place, within 8 miles of Aliwal North, Bethulie Bridge and Norval's Pont, where the cattle may be inspected, and the proposed time of introduction; and upon receipt of such notice the Inspector shall proceed at the time and to the place specified in such notice, or as soon thereafter as may be possible, then and there to examine such cattle.

(4) The person in charge of such cattle shall be bound to produce the certificate aforesaid to the Inspector, and such Inspector shall, if the certificate be in order, and the cattle be free from disease, make an endorsement on the certificate in the form given in Schedule "B" hereto, and the cattle may thereafter proceed on their way. The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, duly endorsed, to any Field-Cornet, Police Officer or owner of land over which the cattle may pass or be passing.

(5) In the absence of the Certificate prescribed in regulation (2) the cattle shall be quarantined for a period not less than twenty-one days at some place on the north bank of the Orange River and in the neighbourhood of Aliwal North, Bethulie Bridge and Norval's Pont where they may be inspected by an Officer of the Colonial Government, appointed for the purpose, at such intervals as may be considered necessary.

(6) On the expiration of the period of quarantine the Inspector, should he be satisfied that the cattle are free from disease, shall issue a Certificate in the form set forth in Schedule C hereto.

(7) The person in charge of such cattle as are referred to in the Certificate mentioned in regulation (6) is liable to be called upon to produce such Certificate to any Field-Cornet, Police Officer or owner of land over which such cattle may pass or be passing.

(8) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for any period not exceeding three months unless such fine be sooner paid.

SCHEDULE A.

I hereby certify that the undermentioned Cattle either have not mixed with and Cattle affected with Lung sickness and are free from disease : or have been effectively inoculated against Lung-sickness and are free from disease, viz :—

Number and general	.....
description of	.....
Cattle	.....
Owner's name and	.....
address	.....
In charge of.....	.....
Place to which Cattle are being sent.....	.....
(Signature).....	.....
(Address).....	.....
Date.....	.....

SCHEDULE B.

(Endorsement to be made by the Inspector.)

I hereby certify that I have examined the Cattle to which this Certificate refers and find them to be free from disease.

(Inspector's Signature).....	.....
(Address).....	.....
Date.....	.....

SCHEDULE C.

I hereby certify that the Cattle to which this Certificate refers have undergone a period of quarantine for at least twenty-one days, that I have examined them and find them to be free from disease, viz :—

Number and general	.....
description of	.....
Cattle	.....
Owner's name and	.....
address	.....
In charge of.....	.....
Place to which Cattle are being sent.....	.....
(Inspector's signature).....	.....
(Address).....	.....
Date.....	.....

RAINFALL, SEPTEMBER, 1902.

NOTE. n.r. denotes that, up to the date of publication, Returns have *not* been received from those Stations.

I. CAPE PENINSULA:		INCHES.	II. SOUTH-WEST— <i>continued</i> .		INCHES
Royal Observatory, 12 inch gauge	..	5.98	Montagu	..	4.22
Cape Town, (Fire Station)	..	6.21	De Hoop (Div. Robertson)	..	3.94
Do South African College	..	7.20	Rawsonville	..	7.47
Do Sea Point Hall	..	5.98	Weltevreden (Caledon)	..	7.36
Do Molteno Reservoir	..	7.37	Karmelk River	..	6.00
Do Platteklip	..	9.75	Danger Point	..	5.15
Do Signal Hill	..	4.74	Vijgeboom River	..	13.05
Table Mountain, Disa Head	..	6.27	Bethlehem (Stellenbosch No. 1	..	0.36
Do Kasteel's Poort	..	10.02	" "	No. 2	12.81
Do Waai Kopje	..	11.84	III. WEST COAST:		
Do St. Michael's	..	11.61	Port Nolloth	..	0.36
Devil's Peak, Block House	..	11.17	Do. (Fay)	..	n.r.
Do. Nursery Gauge	..	11.06	Klipfontein	..	2.22
Do. Lower Gauge	..	10.98	Kraaifontein	..	n.r.
Newlands (Montebello)	..	14.02	O'okiep	..	2.90
Claremont	..	13.53	Springbokfontein (Gaal)	..	3.61
Kenilworth	..	11.22	Concordia	..	2.75
Wynberg (St. Mary's)	..	13.20	Garies	..	1.56
Groot Constantia..	..	10.87	Kersefontein	..	2.33
Tokai	..	9.31	The Towers	..	4.87
Simon's Town (Wood)	..	n.r.	Dassen Island	..	4.54
Do. (Gaal)	..	7.71	Malmesbury	..	4.55
Blaauwberg Strand	..	3.51	Piquetberg	..	4.61
Robben Island	..	5.77	Van Rhynsdorp	..	n.r.
Strandfontein	..	n.r.	Clanwilliam (Gaal)	..	2.43
Camp's Bay	..	n.r.	Do. (Couch)	..	2.02
Fish Hoek	..	6.40	Welbedacht	..	n.r.
Cape Point	..	2.89	Hopsefield	..	3.20
Smith's Farm, Cape Point	..	6.20	Lilyfontein	..	n.r.
II. SOUTH WEST:			Zoutpan	..	3.13
Eerste River	..	7.76	Wupperthal	..	3.11
Klapmuts	..	9.00	IV. SOUTH COAST:		
Stellenbosch (Gaal)	..	8.50	Cape L'Agulhas	..	5.99
Somerset West	..	8.56	Bredasdorp	..	5.80
Paarl	..	8.75	Swellendam	..	4.01
Wellington (Gaal)	..	6.29	Heidelberg	..	3.21
Delta	..	8.46	Riversdale	..	3.47
Tulbagh	..	5.69	Dumbie Dykes	..	4.32
Kluitjes Kraal	..	6.79	Mossel Bay	..	3.25
Ceres	..	11.43	George	..	6.17
Rocklands	..	6.49	Millwood	..	5.57
Caledon	..	5.59	Sour Flats	..	5.97
Do. (Guthrie)	..	n.r.	Concordia	..	5.48
Worcester (Gaal)	..	5.49	Knysna	..	4.73
Do. (Meiring)	..	n.r.	Buffels Nek	..	8.48
Hex River	..	5.04	Harkerville	..	4.47
Lady Grey (Div. Robertson)..	..	2.77	Plettenberg Bay	..	4.56
Robertson	..	3.25	Forest Hall	..	n.r.
Robertson (Govt. Plantation)	..	2.44	Blaauwkrantz	..	4.02

IV. SOUTH COAST—continued.		INCHES.	VII. E. C. KARROO—continued.		INCHES.
Storm's River ..	..	4.72	Graaff-Reinet ..	..	1.18
Witte Els Bosch ..	..	5.14	Do. (College) ..	..	1.05
Humansdorp ..	..	4.13	Do. (Engineer's Yard) ..	..	0.93
Cape St. Francis ..	..	3.29	New Bethesda ..	..	1.86
Hankey ..	..	2.53	Roo de Bloem ..	..	0.91
Witteklip ..	..	6.30	Wallwood ..	..	n.r.
Van Staaden's (upper) ..	..	n.r.	Do. Mountain ..	..	n.r.
Do. (lower) ..	..	n.r.	Jansenville ..	..	1.85
Uitenhage ..	..	3.46	Patrysfontein ..	..	1.48
Do Park ..	..	3.37	Toegedacht ..	..	0.91
Do (Inggs) ..	..	n.r.	Klipfontein ..	..	n.r.
Dunbrody ..	..	2.12	Cranemere ..	..	1.11
Port Elizabeth (Harbour) ..	..	n.r.	Pearston ..	..	1.89
Walmer Heights (near Port Elizabeth) ..	..	2.78	Somerset East ..	..	5.00
Tankatara ..	..	2.15	Do. (College) ..	..	3.88
Lottering ..	..	4.35	Longhope ..	..	n.r.
Shark's River (Nursery) ..	..	2.05	Middleton ..	..	n.r.
Do (Convict Station) ..	..	2.37	Corndale (Div. Aberdeen) ..	..	n.r.
Grootvader's Bosch ..	..	n.r.	Cookhouse ..	..	n.r.
Karnmelk River ..	..	n.r.	Doornbosch. Zwagershoek ..	..	n.r.
Melkhoutfontein ..	..	8.70	Middelwater ..	..	3.12
Vogel Vlei ..	..	3.43	Darlington ..	..	n.r.
Great Brak River ..	..	3.45	Buffel's Kloof ..	..	1.76
Armadaale ..	..	6.17	Glen Harry ..	..	1.23
Victoria Park, P. E. ..	..	2.26	Bloemhof ..	..	1.34
Centlivres ..	..	2.33	Walsingham ..	..	1.37
			Arundale ..	..	2.87

V. SOUTHERN KARROO :

Ladismith ..	..	2.63
Amalienstein ..	..	2.21
Calitzdorp ..	..	4.28
Oudtshoorn ..	..	2.20
Vlakte Plaats ..	..	n.r.
Uniondale ..	..	2.17
Kleinpoort ..	..	3.60
Glenconuor ..	..	4.10

VIII. NORTHERN KARROO :

Calvinia ..	..	n.r.
Middlepost ..	..	n.r.
Sutherland ..	..	2.80
Rheboksfontein ..	..	n.r.
Fraserburg ..	..	n.r.
Onderste Doorns ..	..	n.r.
Droogfontein ..	..	0.66
Gannapan ..	..	n.r.
Carnarvon ..	..	0.67
Wagenaar's Kraal ..	..	0.34
Brakfontein ..	..	n.r.
Vogelstruisfontein ..	..	0.59
Victoria West ..	..	0.66
Britstown ..	..	1.44
Murraysburg ..	..	0.75
De Kruis ..	..	1.30
Richmond ..	..	2.17
De Aar ..	..	1.70
Middlemount ..	..	n.r.
Hanover ..	..	2.44
Philip's Town ..	..	3.00
Boschfontein ..	..	1.85
Petrusville ..	..	1.98
The Willows ..	..	2.76
Naauwpoort ..	..	1.76
Middelburg ..	..	1.75
Colesberg ..	..	2.25
Tafelberg Hall ..	..	n.r.
Rietbult (Colesberg Bridge) ..	..	1.88
Stonehills ..	..	1.75
Craddock ..	..	1.45
Do. (Rose) ..	..	1.01
Varsch Vlei ..	..	n.r.
Witmoos ..	..	n.r.

VI. WEST CENTRAL KARROO:

Matjesfontein ..	..	n.r.
Prince Albert Road ..	..	1.65
Fraserburg Road ..	..	1.08
Prince Albert ..	..	n.r.
Zwartberg Pass ..	..	6.75
Beaufort West ..	..	0.91
Dunedin ..	..	1.05
Nel's Poort ..	..	0.89
Camfer's Kraal ..	..	0.76
Lower Nel's Poort ..	..	1.36
Baaken's Rug ..	..	n.r.
Willowmore ..	..	1.06
Steytlerville ..	..	1.90

VII. EAST CENTRAL KARROO :

Aberdeen (Gaul) ..	..	0.45
Do. (Bedford) ..	..	0.69
Aberdeen Road ..	..	n.r.
Rietfontein ..	..	1.30
Winterhoek ..	..	n.r.
Klipdrift (De Erf) ..	..	n.r.
Kendrew ..	..	0.84

VIII. N. KARROO—continued.	INCHES.	X. SOUTH-EAST—continued.	INCHES
Steynsburg ..	1.53	Adelaide ..	3.32
Do. (Nesemann) ..	1.61	Atherstone ..	3.33
Daggaboer's Nek ..	n.r.	Alexandria ..	3.83
Springfield ..	n.r.	Salem ..	4.09
Quagga's Kerk ..	n.r.	Graham's Town (Gaol) ..	4.46
Tarkastad ..	1.59	Do. (Bact. Inst.)..	4.04
Drummond Park ..	n.r.	Heatherton Towers (near	
Riet Vlei ..	1.34	Graham's Town) ..	2.13
Brand Vlei ..	n.r.	Fort Beaufort ..	2.64
Williston ..	n.r.	Katberg ..	3.29
Omdraai's Vlei ..	n.r.	Balfour ..	3.87
Zwagersfontein ..	n.r.	Seymour ..	1.76
Varken's Kop ..	1.68	Glencairn ..	2.33
Culmstock ..	n.r.	Alice ..	3.02
Doorskuilen ..	1.30	Lovedale ..	n.r.
Houwater Dam ..	n.r.	Port Alfred ..	n.r.
Hillmoor ..	2.52	Hogsback ..	n.r.
Glen Roy ..	2.06	Thaba N'doda ..	n.r.
Fish River ..	n.r.	Peddie ..	2.39
Spitzkop ..	n.r.	Cathcart ..	3.53
Phizantefontein ..	0.91	Keiskama Hoek ..	2.60
Biesjesdam ..	n.r.	Crawley ..	2.72
Groot Vley, Thebus ..	n.r.	Thomas River ..	3.48
Kleinhaasfontein ..	1.81	King William's Town ..	4.47
Scorpion's Drift ..	1.30	Do. Hospital ..	5.31
Beyersfontein ..	1.12	Stutterheim (Wylde) ..	n.r.
Zeekoegat ..	1.35	Do. (Besté) ..	4.09
Haasfontein ..	2.14	Dohne ..	n.r.
Maraisburg ..	1.25	Kubusie ..	n.r.
		Blaney ..	n.r.
X. NORTHERN BORDER :		Kei Road ..	n.r.
Pella ..	n.r.	Evelyn Valley ..	n.r.
Kenhardt ..	n.r.	Berlin ..	n.r.
Van Wyk's Vlei ..	0.86	Isidenge ..	n.r.
Prieska ..	0.83	Pirie Forest ..	n.r.
Dunmurry ..	3.00	Quacu Forest ..	n.r.
Griqua Town ..	2.23	Kologha ..	n.r.
Campbell ..	1.94	Fort Jackson ..	n.r.
Douglas ..	1.88	Komgha ..	4.78
Avoca (Herbert) ..	1.10	Prospect Farm (Div. Komgha)	4.04
Eskdale ..	1.30	Hopewell Do. ..	n.r.
Hopetown ..	1.63	East London, West ..	2.63
Orange River ..	1.50	Do. East ..	n.r.
Newlands (Div. Barkly West)	1.91	Fountain Head ..	n.r.
Groot Boetsap ..	n.r.	Fort Cunynghame ..	n.r.
Kimberley (Gaol) ..	3.05	Katberg Sanatorium ..	n.r.
Do. (Stephens) ..	3.20	Bolo ..	4.63
Beaconsfield ..	n.r.	Fort Fordyce ..	n.r.
Bellsbank (Div. Barkly West)	n.r.	Daggaboer's Nek ..	1.54
Grootdrink ..	n.r.	Sunnyside ..	3.04
Barkly West ..	1.71	Scott's Bottom ..	2.78
Upington ..	0.51	Exwell Park (Waku) ..	2.60
Trooiapspan ..	0.17	Chiselhurst ..	3.97
Karree Kloof ..	2.70	Lynedoch ..	2.35
X. SOUTH-EAST :		XI. NORTH-EAST :	
Melrose ..	2.11	Venterstad ..	1.15
Fairholt ..	2.06	Ellesmere ..	2.56
Cheviot Fells (Bedford) ..	n.r.	Burnley, Cyphergat ..	n.r.
Alicedale ..	1.35	Burghersdorp ..	2.09
Bedford (Gaol) ..	3.42	Do. (Le Roex) ..	n.r.
Do. (Hall) ..	n.r.	Moltano Station ..	n.r.
Sydney's Hope ..	n.r.	Cyphergat ..	1.95
Cullendale ..	n.r.	Thibet Park ..	1.84

XI. NORTH-EAST— <i>continued</i> .		INCHES.	XII. KAFFRARIA— <i>continued</i> .		INCHES
Sierkstroom ..	..	1·05	Mount Fletcher ..	..	0·54
Do. (Veitch) ..	..	n.r.	Elliotdale ..	..	1·22
Rocklands ..	..	1·44	Mqanduli ..	..	n.r.
Aliwal North (Gaol) ..	..	2·77	Matatielo ..	..	n.r.
Do. (Brown) ..	..	2·70	Umtata ..	..	3·75
Rietfontein ..	..	3·39	Qumbu ..	..	n.r.
Buffelsfontein ..	..	n.r.	Kokstad ..	..	0·86
Hex's Plantation ..	..	n.r.	Port St. John's ..	..	7·95
Carnarvon Farm ..	..	1·08	Umzimkulu ..	..	1·45
Jamestown ..	..	2·81	Woodcliff ..	..	2·27
Queenstown (Gaol) ..	..	1·84	Tabankulu ..	..	1·41
Do. (Beswick) ..	..	1·98	Kilrush ..	..	0·56
Dordrecht ..	..	n.r.	Somerville (Div. Tsolo) ..	..	1·25
Tylden ..	..	n.r.	Tsomo ..	..	1·45
Snow Hill ..	..	n.r.	Bazeya ..	..	2·47
Herschel ..	..	3·99	Qwebe ..	..	8·52
Lady Grey ..	..	n.r.	Seteba ..	..	1·20
Bolotwa (Contest) ..	..	2·19	Flagstaff ..	..	3·84
Lady Frere ..	..	1·52	Insikeni ..	..	0·59
Avoca (Div. Barkly East) ..	..	n.r.	XIII. BASUTOLAND :		
Kellands ..	..	n.r.	Mafeteng ..	..	3·69
Barkly East ..	..	3·10	Mohalie's Hoek ..	..	3·82
Glenlyon ..	..	n.r.	Qacha's Nek ..	..	0·79
Gateshead ..	..	n.r.	Moyeni Quthing ..	..	n.r.
Lyndene ..	..	1·73	Teyateyaneng ..	..	n.r.
Mooifontein ..	..	2·01	Leribe ..	..	n.r.
Poplar Grove ..	..	n.r.	Butha Buthe ..	..	n.r.
Biesjesfontein ..	..	n.r.	Maseru ..	..	2·86
Whittlesea ..	..	2·88	XIV. ORANGE RIVER COLONY :		
Halseton ..	..	1·71	Bethulie ..	..	1·92
Middlecourt ..	..	1·97	Kroonstad ..	..	2·51
Doornkop ..	..	1·66	XV. NATAL :		
Palmietfontein ..	..	3·47	Durban, Observatory ..	..	2·54
Blikana ..	..	4·43	XVI. TRANSVAAL		
Table Hill ..	..	3·93	Johannesburg ..	..	n.r.
XII. KAFFRARIA :			Do. Cemetery ..	..	n.r.
Slaats, Xalanga ..	..	n.r.	XVII. BECHUANALAND :		
Ida, Xalanga ..	..	n.r.	Vryburg ..	..	0·37
Cala, Xalanga ..	..	n.r.	Taungs ..	..	1·03
Cofimvaba ..	..	n.r.	XVIII. RHODESIA :		
Nqamakwe ..	..	2·62	Salisbury ..	..	n.r.
Main ..	..	n.r.	Hope Fountain ..	..	0·33
Engcobo ..	..	n.r.	Geelong ..	..	n.r.
Butterworth ..	..	3·84			
Kentani ..	..	4·29			
Malear ..	..	0·27			
Idutywa ..	..	n.r.			
Willowvale ..	..	8·11			

CURRENT MARKET RATES OF AGRICULTURAL PRODUCE.

The following were the Current Market Rates (Wholesale) of Agricultural Produce ruling at the several centres named on Saturday, 18th October, 1902.

CENTRE.	A Wheat per 100 lb.	B. Wheat Flour per 100 lb.	O. Boer Meal per 100 lb.	D. Mealies, per 100 lb.	E Meal per 100 lb.	F. Barley per 100 lb.	G. Oats, per 100 lb.	H. Oat-hay per 100 lb.	J. Potatoes per bag	K Tobacco (Boer Roll) per lb.	L. Beef per lb.	M Mutton per lb.	N. Fresh Butter per lb.	O Eggs per doz.	P Cattle (Slaught- er) £ s. d.	Q Sheep (Slaught- er) £ s. d.
Altwal North	0 10 0	0 17 0	0 12 6	0 10 0	0 11 6	0 9 0	0 14 0	0 13 0	1 0 0	0 0 11	0 0 11	0 0 11	0 1 9	0 2 0	£ s. d. 0 18 to 23	£ s. d. 27/- to 27/-
Beaufort West	0 14 6	1 0 0	1 4 6	0 13 6	...	0 13 0	0 18 0	0 16 8	0 19 6	0 0 7	0 0 9	0 0 8	0 2 0	0 2 0	0 2 0	25/-
Burgersdorp	0 12 0	...	0 14 0	0 13 0	...	0 10 0	...	...	0 13 0	0 1 6	...	0	0 2 6	0 2 0	...	...
Cape Town	0 11 0	0 12 6	0 11 0	0 9 0	0 13 0	0 9 0	0 12 8	0 11 0	1 0 0	0 2 0	0 0 8	0 0 7½	0 1 5	0 1 9	...	...
Olavwilliam	1 2 6	1 15 0	1 0 0	...	...	1 10 0	...	2 0 0	...	0 1 6	0 0 8	0 0 8	0 1 9	0 1 6	18 0 0	20/-
Colesberg	0 12 3	...	...	0 12 0	...	0 10 0	...	...	0 17 6	...	...	...	1 10	0 1 6	...	...
Oradock	...	...	...	1 12 6	...	...	...	...	1 0 0	0 1 0	0 0 9	0 0 7½	0 2 0	...	...	...
Dordrecht	0 10 0	...	0 15 0	...	...	...	...	...	1 0 0	0 1 1½	0 1 1	0 1 0	0 2 9	0 1 6	...	...
East London	0 12 0	0 17 9	0 12 9	0 12 9	0 10 0	0 15 0	0 18 0	0 13 0	1 11 0	0 1 6	0 1 1	0 1 1	0 2 0	6	22 0 0	...
Graaff-Reinet	0 13 3	...	0 13 9	0 13 1	...	0 10 6	0 10 0	...	0 16 0	0 0 4½	0 0 7	0 0 7	0 2 8	0 1 4½	£15 to 20	24/- to 27/6
Graham's Town	...	...	...	0 17 0	...	0 10 0	...	0 10 0	0 16 0	0 1 3½	0 0 10½	0 10 0	0 2 2	2	...	...
Kimberley	0 13 0	0 17 0	0 16 0	0 13 0	0 12 6	1 2 0	0 13 6	0 13 0	1 6 0	0 1 0	0 2 2	0 10 0	0 2	0 2 0	£14 to 20	20/- to 25/6
King Wm's Town	0 13 6	0 17 6	1 2 0	0 13 0	0 10 0	0 11 0	0 13 6	0 11 0	0 13 6	0 1 0	0 0 8	0 0 11	0 2 2	0 1 3	...	25/6 to 34/-
Malmesbury	0 10 6	0 13 0	0 12 0	0 10 0	...	0 9 6	0 9 6	0 10 0	1 1 0	0 1 3	0 0 8	0 0 8	0 1 9	0 2 0	16 10 0	25/-

CURRENT MARKET RATES OF AGRICULTURAL PRODUCE—(continued).

ORIENTAL.	A. Wheat per 100 lb.	B. Wheat Flour per 100 lb.	C. Rice per 100 lb.	D. Meal per 100 lb.	E. Meal per 100 lb.	F. Barley per 100 lb.	G. Oats per 100 lb.	H. Oat-hay per 100 lb.	J. Potatoes per bag.	K. Tobacco (Boer Roll.) per lb.	L. Beef per lb.	M. Mutton per lb.	N. Fresh Butter per lb.	O. Eggs per doz	P. Cattle (Slaugh- ter)	Q. Sheep (Slaugh- ter)
Mossel Bay	£ s. d. 0 13 0	£ s. d. 0 14 0	£ s. d. 0 13 0	£ s. d. 0 9 0	£ s. d. 0 7 6	£ s. d. 0 10 0	£ s. d. 0 10 0	£ s. d. 0 7 6	£ s. d. 2 0 0	£ s. d. 0 1 0	£ s. d. 0 0 9	£ s. d. 0 0 9	£ s. d. 0 1 6	£ s. d. 0 1 6	£ s. d. 0 1 6	£ s. d. 0 1 6
Pietermaritzburg Natal	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Port Alfred	..	..	..	14 0	..	..	..	..	0 16 0	..	..	..	0 2 6	0 1 9	..	..
Port Elizabeth	..	..	..	0 11 6	..	0 6 6	..	0 8 0	1 1 0	0 0 4	..	..	0 2 3	0 1 7	..	..
Queen's Town	0 10 9	0 15 3	0 9 6	0 13 0	0 5 3	0 9 0	0 7 0	0 7 3	1 5 0	0 2 6	0 0 8	0 0 7	0 2 0	0 1 6	..	..
Tarkastad	0 12 6	1 1 0	0 14 0	0 10 0	..	0 10 0	..	0 8 6	1 0 0	0 1 6	0 1 0	0 0 10	0 2 5	0 1 4	..	..
Vryburg	0 16 0	1 1 6	0 18 0	0 15 0	0 16 6	0 12 6	0 13 6	1 1 0	1 7 6	0 1 9	0 0 10	0 0 10	0 2 6	0 2 6	16 0 0	1 5 0
Worcester	0 11 6	0 15 0	0 12 6	0 11 0	0 13 0	0 10 0	0 11 0	0 6 6	1 6 0	0 0 9	0 0 8	0 0 8	0 1 9	0 2 0	15 0 0	1 15 0

NOTE—No Return has been received from the Civil Commissioner of Pietermaritzburg

THE Agricultural Journal.

No. 6.

DECEMBER 1st, 1902.

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EDITORIAL NOTES.

The Albany Agricultural Society has decided to hold a show at Grahamstown on the 26th and 27th of March, 1903. The Glen Grey Society also holds a show in March.

The Secretary of the Jockey Club of South Africa is anxious to have the official Stud Book kept by him as complete as possible, and would urge all breeders not to omit registering their thoroughbred foals. The fee is a nominal one of 5s., when a certificate will be furnished for each registration.

Attention is directed to a scheme for manurial experiments appearing under the heading of "Queries and Replies." Most farmers are enquirers on the subject and this article (by Dr. Nobbs) supplies an answer to the majority. It gives a scheme which is satisfactory and not over elaborate and the same time is within the means and knowledge of every cultivator with a little spare ground and time to attend to it.

Country reports occupy a great deal of space in this issue and some correspondence and other items including the Eastern Province Horticultural Board meeting are crowded out. We trust our contributors will bear with their exclusion until next month. The gathering of reliable agricultural news in South Africa is a difficult task and one which has not been very successful in the past. The system now adopted, however, promises to supply the much felt want and we trust will be generally appreciated. The value of reliable information as to the condition of crops and stock in the different parts of the Colony cannot be over-stated. It is not only the farmer who is interested but the business man as well.

Caledon is making rapid strides forward and the establishment of the Agricultural Society there should mark an epoch in its progress. Its objects are: Annual wool sales, Stock and Produce Fairs, general promotion of farming interests. A representative committee of 24 members has been elected, consisting of three from each field-cornetcy and town. Dr. Viljoen is president.

Locust destruction is occupying the attention of the Transvaal Government. Capt. Mavrogordato, an expert from Cyprus, has arrived to undertake the work. The methods to be adopted are not yet announced, but we doubt if they can improve on the great soap and water cure.

The success of the McCormick Harvester in the recent competition at Elsenburg comes at an opportune moment, for this machine is being pushed for all it is worth in the South African market just now. We learn that Messrs. Malcomess & Co., the agents for the eastern part of the Cape Colony and the Orange River Colony, have recently landed very large shipments. In fact during the month of November this firm landed no fewer than 500 McCormick Binders, over 1,000 Daisy Reapers, and a large number of mowers, horse rakes, and sickle grinders. These large importations augur well for the future of South African farming operations, and indicate how unbounded is the confidence of the most enterprising firms in the agricultural prospects of the country generally.

The selection of Elsenburg for the trial of harvesting implements inaugurated by the Western Province Agricultural Society has served the double purpose of supplying a really interesting contest

demonstrating the capacities of certain classes of agricultural machinery, and focussing attention on the work being carried out at the Government School of Agriculture. As the implement makers and their agents may always be relied upon to see that their wares are brought prominently to the notice of likely users, we incline to the belief that the most valuable public service rendered by this function is that involved in the attention which is again directed to the Agricultural School. The work being accomplished at Elsenburg in a quiet and unassuming way is most important to this Colony and it is as well that the farming community particularly should be given an opportunity of seeing for themselves what the place is like and judge for themselves of the value of the educational facilities offered. A visit to the farm has a most favourable effect on most people and it is to be hoped that the advantage of the technical training offered will be more fully appreciated in the future.

The destruction of Rammenas, that annoying and damaging pest among cereals in the Western Province, is dealt with in this issue by Mr. Hugh Sampson. The destruction of these weeds by chemicals has met with a good deal of success in other parts of the world but it is essential to remember that the spraying is only effective when the plant is still young and succulent, that is before it flowers. A correspondent tried spraying about two years ago when the Charlock was 18 to 20 inches high and, of course, he did not meet with success as the plants seemed little affected by the solution. To make quite sure of success the spraying should be done at a very early stage.

Incidentally, Mr. Sampson accentuates the growing need for a seed control station which is certainly one of the great wants of the Colony. So much seed is now being imported that it is highly necessary for some check to be exercised over it or the country may be overrun with imported weeds in addition to those of home growth. A greater evil could not afflict us. Another thing which a seed control station could guard against is the fraud which is sometimes practised in the sale of Colonial grown seed as imported. It may be accident or design or a little of each, but however it comes about it is very certain that many a bag of seed oats and seed wheat sold to farmers as imported, has never crossed the sea. These things should be guarded against and the best and most reliable preventive would be the establishing of a seed control station to which farmers could send samples to be tested.

With reference to the destruction of rammenas by spraying with copper-sulphate some careful tests are reported by the English Board of Agriculture which were carried out at the Cambridge University Farm. Nitrate of soda was used and failed in every case. Whereas the area which got 40 gallons per acre of a 4 per cent. solution of copper-sulphate was almost cleared of its charlock (rammenas)

while the barley, oats and clover plants were uninjured. The conditions were precisely the same as regards weather and state of the crop.

The rinderpest statistics for November are very encouraging. In one month the number of infected areas has been reduced from 77 to 45 and only 149 deaths had been reported. Some opposition was shown at first to the methods adopted by the Veterinary Department, but that has gradually died away and the wisdom of the policy adopted by the Department is being very generally appreciated. There are, of course, still some sceptics who prefer the old methods with all their attendant risks.

Mr. Hutcheon, C.V.S., in an interview with the *Northern Post* said the plan of inoculation adopted in the Herschel District, where great success has been attained in the suppression of rinderpest, was first to inoculate the infected cattle with a very large dose of serum and then to inoculate the surrounding cattle and prevent them from coming in contact or mixing with the other herds. There had been no extension of the disease from those centres where that plan had been well carried out. If this were strictly adhered to, he has every confidence that the disease would soon be stamped out. The results of the work done in the Herschel District, Mr. Hutcheon stated, show what can be done with serum inoculation if systematically and judiciously carried out even in a native area, which is more difficult to manage than in a district occupied by European farmers, where isolation can be carried out much more effectively. During his stay in the Herschel District Mr. Hutcheon superintended the inoculation of 5,000 head of cattle.

It is more than gratifying to notice that the all-important question of tick-infection is attracting more interest as the subject becomes more generally understood. Our correspondent "R. W." shows in this issue other means by which ticks can be destroyed and they appear to be so simple as to call for general adoption. The use of dips for this purpose has been generally allowed to be effective so far as the actual killing of the individual tick is concerned. And the fact that an emulsion made with soap and Cooper's dipping powder has proved successful, used either as a spray or applied by hand with a bit of sheep-skin only bears out what has been published in the *Agricultural Journal* recently. In the November issue Mr. Lounsbury, the Government Entomologist also mentioned the emulsion of paraffin and soapy water, but his information led him to describe these preparations in the following words: "they are some trouble to prepare and in several respects inferior to mechanically mixed oil and water, especially for tick destruction." The preparation of the paraffin and soap emulsion may make all the difference,

of course, and the careful directions noted by our correspondent (himself a farmer of great experience) may make the mixture more effective.

Now that this question has been so thoroughly investigated as to give certain positive deductions as a working basis, it is to be hoped that the cattle and sheep farmers of the country will turn their attention to the further development of the theory that tick eradication is not only desirable, but well within the scope of practical farming. The advantages of pastures comparatively free of ticks cannot be denied by anyone. So far as all enquiry has resulted they are an unmitigated pest and they have ruined millions of acres of first-class grazing country by their presence and the fatal diseases they disseminate. Could a stronger case for united action be presented to any community of intelligent men whose interests are at stake? It is a case which at least calls for the fullest and closest investigation, and the experimental trial of all and every reasonable remedy that may be suggested. Destruction by mechanical means seems the most promising and we trust to see united action taken in this direction before very long.

The Chief Inspector of Stock, Queensland, in his report for 1901 just to hand deals at some length with Redwater or Tick Fever. He says: "Cattle in the Northern Districts where the pest first appeared are now reported to be immune to Tick Fever, and, although in many cases ticks are present, they seem to cause no ill-effects in the cattle. Cattle, however, from clean districts that are travelled into infested districts almost invariably contract the fever. Experiments in dipping with various medicaments were continued during the year, and, it is satisfactory to have to report, with a large measure of success. By permission, Mr. J. C. Brunnich, the Analytical Chemist of the Agricultural Department undertook the preparation of a dip, based on that most generally in use and popularly known as 'Christian's dip.' Mr. Brunnich's formula is as follows.—

Arsenic	...	...	8 lbs.
Caustic Soda	...	...	4½ lbs.
Tallow	...	...	8 lbs.
Best Stockholm tar	...	...	2½ gals.
Water	...	...	400 gals.

The mode of preparation is as follows: (a) Half fill with water a 5 gal. drum; add 2 lb. caustic soda and boil. Then add slowly 8 lbs. arsenic. Add cold water in small quantities, to prevent boiling over, until the drum is full. (b.) Boil 100 gallons water in a 400 gal. tank; add 2½ lb. Caustic soda; then 8 lbs. tallow and boil quickly. Add slowly in a thin stream 2½ gals. of Stockholm tar.

When the whole of the tar has been added, boil from thirty to forty minutes, then add the solution prepared in accordance with instructions in (a). Gradually fill the tank with water and keep the mixture boiling until the tank is filled.

"This dip was tested by Mr. Brunnich in presence of the Moreton District Inspector, and was found most effective. By the use of caustic instead of common soda as in Christian's dip, the time occupied in boiling is greatly reduced. A large number of dairy-men and others in southern and central Queensland prefer to use Erkenbrach's dip, commercially known as 'skin poison,' which they state they have found very effective, easily prepared, requiring no boiling, and does not injure the skin. As has been frequently pointed out, a strict maintenance of the proclaimed quarantine lines and a rigid observance of the restrictions on the movements of stock within and out of infected areas have occasioned heavy monetary losses. The losses from ticks on our Northern and Central coastal districts on the earliest appearance of the pest were exceptionally severe; but with our extended experience we now know that a very large percentage of the deaths of cattle were not due to tick fever, but to anæmia due to gross tick infestation. In districts where dipping has been extensively resorted to, and where, by that means, gross infestation has been prevented, deaths from anæmia have been all but unknown. Of course dipping does not protect the cattle from Tick Fever, but the mortality from that disease where cattle have been periodically dipped—even where inoculation has not been carried out—has been small. Another great advantage resulting from dipping is that it prevents the maturing of female ticks and renders fully developed ticks sterile, thus greatly checking the increase of the pest.

"An impression appears to prevail in some quarters that dipping injures the stock particularly dairy cows. The evidence of Dairy farmers in Southern Queensland disproves this. In one instance the Moreton Inspector reports that after dipping a herd of dairy cattle in his district the production of cream increased very considerably, and for only one day after dipping was the quantity reduced."

A good many pages are again devoted in this issue to questions affecting the wool trade. The article "The Cape Wool Trade," speaks for itself and the accompanying illustrations of Australian methods will help our sheep farming friends, we trust, to realise that there is a vast difference between the wool industry of South Africa and the wool industry of Australia. We have pointed out before the main points of difference and there is no call now to accentuate them. Neither have we any desire to make invidious comparisons. What we wish to emphasize is the glaring fact that our conditions are wholly different and until we are prepared to organise a huge

wool industry on the same basis as that of Australia we must arrange our working plans on a more modest scale.

This brings us to the question which originally gave rise to the discussion, namely, the advisability of the Frontier sheep farmers securing the services of a professional grader to assist them in improving their output. The information since published in the *Agricultural Journal* should convince our Frontier friends that success is not contained in the adoption of a portion only of successful people's methods.

The sheep-grader is only a part of an elaborate system. Like the machine shearing gear, he is an excellent institution where things are done on a large scale. But for small farmers—and the biggest of our sheep men would scarcely rank above what the Australians good-naturedly call a "Cockatoo farmer"—to attempt to adapt one piece of a comprehensive machine to their needs does not carry with it an appearance of wisdom. The machine shear is an excellent thing in itself and it is surprising that it has not been tried more in South Africa, but it is doubtful if it would pay to instal it for the shearing of small flocks. In this country too labour is as a rule much cheaper—though scarce and dear just now—and the stern necessity for the adoption of labour saving appliances has not been forced on the agriculturist with that unyielding pressure that prevails in other countries.

What our sheep farmers should do is to keep before them—that is those who depend on wool—the main fact that the wool is the foundation of their industry. To improve their flocks then they must improve them on a wool basis and to do this expert advice on the wool and its treatment is what they should seek. A well-trained wool-classer attached to an Agricultural School situated in the Eastern Province could do more to help the sheep farmers in five years than could be accomplished by other methods in ten. Of course it will be retorted that there is no Agricultural School. That could soon be remedied if there was a promise of it being supported. And if a school were established on the right lines we believe it would attract more pupils than could at first be accommodated. The younger generation now coming on needs better instruction than is available on the majority of our farms particularly in such matters as the handling of wool. The wonderful work accomplished by the technical school at Adelaide should be sufficient inducement to forward any such scheme in this country. Elsenburg is doing good work but it is only one institution and the course is not sufficiently comprehensive to attract Eastern Province farmers.

The increasing prevalence of stock thefts along the Barkly East border where it adjoins Herschel and Basutoland has moved the New England Farmers' Association to "view the position with alarm."

Mr. C. A. Sephton who moved the resolution said:—Hundred and thousands of sheep have of late disappeared from the Barkly East district, and scarcely a trace of them is even discovered. The present state of things cannot be permitted to continue without grave consequences. It is on this account, therefore, that the Association appeals with earnestness to the Government for protection, and would respectfully suggest that for such purpose sufficient native detectives should be employed in the native territories. It is there, where almost every native knows his neighbour's business, that the truest opportunities occur for the detection of stolen stock. If worked from this side, the position and nature of the district is so adverse that the task is next to an impossibility.

An ordinance has been promulgated in the Transvaal to prohibit, for a period of two years, the slaughter for sale of any cow, heifer, or calf, or to sell or offer for sale the meat of any such cow, heifer, or calf which shall have been slaughtered in that colony. The penalty provided for contravening the ordinance is a fine not exceeding £50 or in default imprisonment with or without hard labour for a period not exceeding six months. The mere fact that the meat of cows, heifers, or calves has been offered or exposed for sale shall be presumption that the said animals have been slaughtered in the colony. The Lieutenant-Governor has power during the period of two years to suspend the operation of the ordinance throughout the Colony or any district thereof. The ordinance is intended to apply more particularly to butchers who occasionally offer Colonial meat for sale as a special luxury at enhanced prices on those charged for the imported frozen article, a curious inversion of the state of affairs prevailing before the war, when it was the habit to sell the imported article as a special luxury. Owing to the very great scarcity of oxen and the urgent demand that exists for transport animals, it is rare indeed for an ox of any age or condition getting as far as the shambles. The depletion of stock must have been terrible to make such a measure necessary. The ordinance is extended to the Orange River Colony.

The experimentalist attached to the Ontario Agricultural College in his report for 1901, referring to a visit which he paid to fifty of the leading agricultural colleges and experiment stations in Germany, Switzerland, Austria-Hungary, France, Belgium, Holland, and the United Kingdom says: "From the complete and comprehensive system of agricultural education given in some of the European countries we have much to learn. In France, for instance, agricultural instruction forms an important part of the general system of the public education—the pupils starting their agricultural studies in the public schools when only seven years of age. In carefully systematized and thoroughly conducted scientific research

directed along special and well defined lines and conducted for long periods of time, some of the European experiment stations were pioneers in the work and are leaders to the present day. In the investigation of seed, the improvement of farm crops, and the production of beet sugar; in the economical use of land and the thorough cultivation of the soil; in the management of the forests and the construction of good roads we can also obtain valuable lessons from the people of Europe. Europe is doing much for agricultural science; America is doing much in the application of agricultural science to practical agriculture. I could not find so close relationship between the scientific and the agricultural world in any of the countries of Europe as I find in America and especially in our own province of Ontario. In higher agricultural education for farmers' sons; in agricultural station work for the farmers; in co-operative work in agriculture by the farmers themselves; and in a complete and comprehensive system of farmers' institute meetings, I have failed to find either in Europe or the United States anything equal to what we have in Ontario."

The eternal problem of "Heredity and Variation" forms the subject matter of a series of contributions appearing in another part of this issue. Our readers will quite realise how difficult it is to deal fully with such far-reaching questions in a publication like the *Agricultural Journal*, and thanks are due to our contributors for the really able manner in which they have summarised the subject. We need scarcely add that the literature on the subject is both extensive and varied and any attempt to bring it within reach of the casual reader, can, we fear, but result questionably. The one subject of "In-Breeding" has exercised the minds of breeders since the science has been known, and is a fruitful source of discussion at the present day. It will probably remain so, for with breeding, like most other occupations based on accurate observation of natural laws, a great deal depends on the breeder. One man will succeed where another fails, merely by the exercise of that quality we call judgment for want of a better name though in some men it would seem to be more like an instinct. And the successful methods prove futile in the hands of the third. And so the story goes on and on.

Some will tell of the complete exhaustion of an in-bred herd of cattle and prove it by chapter and verse. These are cases where inbreeding has been carried to excess, for the progeny not only inherit the useful and desirable qualities of their parents but also their weaknesses. Careful selection is the only safeguard against the perpetuation of the faults and in cases where a breed or family becomes exhausted it may be safely assumed that the supervision has been lax and the rejections ill-judged. On the other hand, instances might be multiplied indefinitely of successful long-continued in-breeding in cattle similar to that mentioned in a late number of the *Live Stock*

Journal. The herd was established in the year 1843, at the Hollies, a small holding situated close to the foot of the fells in the vale of Lorton, Cumberland. In the year named Mr. J. Banks, then tenant of the farm, not being content with the quality of his cattle sold three of his cows and with the proceeds of the sale set off in quest of fresh blood. He travelled on foot to Lowther Castle near Penrith, and from there went to Mr. Unthank, at Netherscales, where he purchased a cow called Red Rose for forty guineas, and drove her home to the Hollies, about thirty miles over some of the wildest part of that rugged country. The account of the herd in the journal mentioned states.—“From that cow alone a herd of really splendid cattle have been bred, and what is the most remarkable feature in the history of this herd is the fact that since a few years after the purchase of Red Rose, no out-cross has been introduced; cows and bulls, all direct descendants of this one cow, have been mated, and have bred till now they are cattle of a stamp difficult to beat in any herd. Wide-chested, deep and level carcase, evenly fleshed, with a profusion of hair, and heads of a beautiful shorthorn type were the qualities which made these cattle so much admired.” The character of the old farmer, as shown in his sturdy independence in walking over the country in search of the animal he wanted, the remarkable judgment he displayed in making his selection, and then driving his purchase home, are admirable, and quite different from the mode of proceeding that would be adopted by a farmer of the present day. This herd was dispersed on February 18, when the stock made excellent prices.

Then we have the legendary lore of the lost glories of the various named cereals or tubers of the golden past. And all this apart from the passing fashions, for strange as it may seem, there are fashions in crops as in other things. These subjects bring to mind a recent contribution to *The Times* (London) from the pen of Mr. W. J. Malden (Author of the “The Potato in Field and Garden”) who wrote:—“It has been announced in the Press that the powers that be intend to get supplies of potatoes for planting purposes in the newly-acquired South African Colonies from Madagascar and the Soudan, the extraordinary reason for selecting these countries to supply sets being that it is supposed that they are ‘acclimatised’ to African conditions. This is tantamount to saying that the Colonist and burghers are to have palmed on them more or less worn-out varieties; for these countries grow deteriorated English varieties. Surely those who have suggested this must know that the vigour of a variety of potato is but of short duration. Every year makes it a weaker cropper and far more likely to succumb to disease.

“The excessive tuberation which potatoes brought under cultivation acquire is unnatural: and the plants are much more liable to contract disease than are those which have been left as weeds in their natural condition. Unless new varieties, the result of cross-breed-

ing, were constantly being developed, potatoes could not be grown profitably in any country; in fact, by this all would have disappeared. Every potato-grower of experience is constantly on the look out for new varieties, the result of cross-breeding and selection, to take the place of those which have been on the market a few years, because it is so generally recognised that a variety must always be coming forward to replace those which have reached the zenith of their popularity and have started their downward course. The past quarter of a century has seen the rise, fall, and oblivion of a host of British varieties. Some have made rather longer stays than others, and their names have been household words for a few years; but at any rate, among those who grow on a large scale they have been replaced by others, and it is only in out of the way places or in gardens of those out of touch with what is going on around them that their names are kept alive.

"Presumably those who advise what they call 'acclimatised' varieties are unaware that the countries to which they look to replenish South Africa receive fresh stocks from England, and that by the time they are sent to these countries their first vigour has left them. I speak with personal experience in exporting potatoes to many countries, not excepting South Africa and Egypt, and I know that the bulk of the potatoes sent out are from stocks which have become decadent, because the foreign importers have not given the price which new varieties fetch. Yet it is from the worn-out stocks of Egypt that South African potato cultivation is to be re-established. The South Africans will find these relatively just about as useful as the worn-out remounts which found their way to South Africa during the war. This is not the place to suggest what varieties are best suited to reseed South Africa; but I hope some one will be led to stop such an unscientific, an unpractical step as the using of worn-out or 'acclimatised' potatoes. Otherwise, before the stocks sent out can possibly be developed to quantities that can substantially help the country they will have broken down altogether."

The Government is offering a very substantial help to farmers who wish to go in for planting timber trees. A certain number of surplus tree seedlings will be available in the Government forest nurseries at Tokai, Elgin (on the Caledon Railway), Ceres Road, Robertson, Hanover and Groot Vader's Bosch. These seedlings offer a chance to farmers at a distance. The cost of transport even of young trees 25 in a half paraffin tin is expensive. These seedlings are about two or three inches long ready for pricking out, and they are sent either growing from 400 to 500 in a tin or taken out by the roots and packed for sending by parcel post to any address in Cape Colony. The cost of the seedlings is 4s. per 1,000, and the cost of packing and post to any part of Cape Colony comes to about 4s. more. The seedlings are sent out packed in moss or forest humus, and in this way will travel for a week or ten days

without damage. On receipt, all that is required is to prick them out in paraffin tins and keep them in a cool shady place until they are set. The surplus seedling distribution comprises mostly those trees which are being largely grown by the Forest Department, that is to say, the timber trees which are most profitable to plant. Surplus seedlings offer undoubtedly the best chance of getting young trees at moderate prices to farmers and others at a distance from the Government nurseries.

It is gratifying to read the report of the annual meeting of the Angora Goat Breeders' Association (published in another part of this issue) and to note the really excellent work accomplished by that body in the face of very serious difficulties, after three years of active hostilities, during a great portion of which the Angora districts were among those actually invaded by the enemy and shaken by rebellion. The plaintive statement of the secretary that his attempts to get a general meeting together failed "because members were unable to attend" raises a smile when one considers the circumstances. However the executive courageously kept the society going and carried on the highly valuable work it had undertaken during the whole of the period of disturbance. Those gentlemen now have their reward in being able to show to the Angora breeders of South Africa a record of excellent work accomplished in the best interests of the industry.

The work of the Association is so peculiarly exacting even in the most favourable conditions that the successful manner in which the Executive kept it going during the troublous times is the more remarkable. The examination of the goats submitted for admission to the Stud-Book is in itself a laborious task, the inspectors are called upon to make long journeys to see the animals, and not once only but on no less than three different occasions before the reports can be submitted. That is why the figures seem rather meagre when presented. Of the 1,300 animals submitted during the past three years only 120 have passed, the remainder—with the exception of final rejections—being now on their second and third year of trial. But the very paucity of these figures is a guarantee of the value of the work accomplished. And the care bestowed is already having its effect for the value of each animal in the Society's Stud Book increases from the moment it is finally accepted.

With such a valuable work going on from year to year and the great care and control now exercised over the greater portion of the best stud Angoras in the country a change should soon come over the Cape mohair industry. Not an animal of any value once it is entered permanently in the Stud Book, is now lost sight of. We may even go further and state that as keen a watch is kept on the progeny. In the old days the breaking up of a flock meant their dispersion to the four winds so far as breeders generally were concerned. Now

every animal can be traced and is known, as well as its quality. The advantage to the industry needs no further demonstration, and all who desire to see mohair-growing rank high in the list of our staple rural products will support and forward as much as possible such a helpful and sturdily self-reliant organisation.

The success which has attended the Angora Association so far holds out great promise for the future. It is true that Turkey hair still tops the Bradford market, and the western farmers of the United States are turning their attention very seriously to the breeding of Angoras. So far as Bradford is concerned we still cherish the belief that the Cape will yet dominate that market for quality, as it undoubtedly does now for quantity. There is no reason at all why the labours of the Angora Association should not carry it so far as to lay down a definite set of rules and regulations by which the breeder would be assisted in the production of the various grades of the merchantable article. Why not, for instance, encourage the breeding to definite types and make those types agree with a standardised hair that will meet the demands of the manufacturers. It is not a great task and should certainly be kept in view.

As to the Americans and the competition threatened in that quarter there are two views of that contingency. The first and most satisfactory is the fact that the Americans so to speak, consume their own smoke. The high protective tariff makes it possible for American Manufacturers to consume all the mohair that can be produced there for many years to come. So that it will be a very long time, if ever, before the Yankee article is intruded as a serious competitor into our markets. On the other hand we seem to have shut ourselves out of what promised to be a good market for stud stock by the export duty on Angoras. One has but to glance at the western farming Journals of America to see how futile the effort to prevent the growth of the Angora industry there has proved. Whereas with an open market our breeders might do a fairly lucrative trade in stud stock for some time at least. If this were accompanied by careful grading to standard to meet the demands of the mohair market the industry should benefit thereby. Of course there are other views, but there is room still for discussion.

As we go to press the first number of the *Transvaal Agricultural Journal* has come to hand. It is excellently got up and though not over bulky, contains a good deal of interesting information in a concise form. The editor is Mr. A. R. E. Burton, who for some months was responsible for the production of this Journal. We extend a hearty welcome to the new publication and wish it every success. It is to be published quarterly.

Dr. Thieler, Government Bacteriologist to the Transvaal Government, in the first issue of the *Transvaal Agricultural Journal*, adds

his voice to the already swollen chorus of experts who have closely investigated the so-called "new" disease among the cattle of Rhodesia. He comes into line with the others and plumps for "red-water." He says: "I have no hesitation in declaring that the so-called 'new' disease belongs to the group of diseases caused by endoglobular parasites of genus *pyroplasma* or *pyrosoma*, commonly known in the literature on the subject as Texas fever or tick fever, and, particularly in South Africa, as redwater. I wish, however, to emphasize the fact that this Rhodesian form of redwater does not represent itself under the form hitherto familiar to the South African observer; a circumstance which explains the widely different opinions on the subject."

Dr. Thieler's further observations serve to accentuate the possibility of a danger hinted at in the last issue by ourselves. He says: "I may also state that, in my opinion, there is no difference between redwater as I saw it in Rhodesia and the disease observed by me amongst cattle in Pretoria last June, and also in Komati Poort in the latter half of the following August. I have arrived at this conclusion after a careful microscopical examination of the specimens collected in Rhodesia, and their comparison with those obtained in the Transvaal. The clinical observations and the *post-mortem* examination point also to the same conclusion. It is therefore necessary to enter somewhat into details in order to establish my position." He then proceeds to give details justifying the deduction arrived at.

These investigations carry him a step further and continuing he states:—I found in my microscopical researches on ordinary South African red water that in the majority of cases the round or oval shaped pyrosomas are less numerous in the circulating blood, but very frequent in the kidneys. In all these instances a discoloration of urine was observable. In the newly observed Rhodesian form of redwater, however, the parasites are enormously frequent in the blood stream, and yet in the majority of the cases I observed no discoloration of urine. Hence I am inclined to believe that it is principally from the location of the parasite that the cause of the difference in symptoms arises. Koch considers the bacilliform parasites as the young forms, and the oval and round ones as the adult forms. This would indicate that the animal died from the effect of the infection before the parasites had time to become fully grown, and thus Mr. Robertson's opinion, viz.—that the constant presence of the bacilliform pyrosomas accounts for the uncommon virulency of the disease—is confirmed. It must not be forgotten, however, that many cases of redwater with normal urine may be observed where only the full-grown oval or round parasites are found. Professor Loveran, of Paris, a well-known authority on the subject of blood parasites, to whom I had sent specimens of pyrosomas which I thought were not identical with the ordinary form of redwater, informed me that he considered the

specimens belonged to the species of *pyroplasma pigemum*, and that there was nothing to warrant an opinion that they were of a new species."

Dr. Thieler also says:—"Lignieres, who worked on a preventive inoculation against *tristeza* (*alias* redwater) in the Argentine, writes me on the subject to the effect that he found that there exist several varieties of *pyroplasma*, and although an animal may prove to be immune against one variety of *pyroplasma*, such immunity will not protect the animal against another more virulent variety. This seems to be the position here, especially in the case of the Rhodesian redwater outbreak, and indicates that similar observations and conclusions have previously been made in other countries in connection with the form of disease under notice." In conclusion he recommends the utmost vigour in dealing with outbreaks of the disease in order to prevent it from becoming widely disseminated, and points to the potential danger contained in the re-stocking operations.

The uncertainties of thoroughbred Horse breeding are known to no one better than to the thoroughbred breeder. Speaking on this subject a man who has had many years' experience said recently to a member of the American *Horseman* staff:—"We are no nearer the positive than our grandfathers were. We talk of the best blood lines to cross, we try the cross, and failure results. It is easy to breed to colour or even to form—conformation—but when it comes to breeding for the diverse qualities which go to make a race-horse, we are groping in the dark. It is only in a general way that the breeder has any knowledge. He knows that if he breeds a good mare to a good horse, the product is likely to be good; but if the horse or the mare was of really high class, the probability is that the produce will not be as good as the better of its parents. When the first foals of Miss Woodford and Firenze were led into the sales ring, and when Salvator's first get were shown by the auctioneer, there went up shouts of applause from the ringside. That was purely sentiment. The yearlings were beautiful to the eye, and because of their progenitors they fetched big prices. What was the result? Mediocrity. Nothing more. And yet there are those who argue that it is a science, this breeding of race-horses. If it were a science, results would be certain, since science is certain. Results are not certain, but testotally uncertain." This experience is but the alphabet of the calling. The yearling sales in England, if the career of the animals is followed up, show much more remarkable results. The thoroughbred colt has a strong resemblance to the little girl in the nursery rhyme for "when he's good he's very very good" as a rule, but "when he's bad he's horrid."

It is believed (according to *Flayer's Magazine*) that insects are responsible for the destruction of one-tenth the agricultural products of the United States, or a total of \$330,000,000. This magazine

says:—"The chinch bug caused a loss of \$30,000,000 in 1871 upward of \$100,000,000 in 1874, and in 1877 \$60,000,000. The Rocky mountain locust, or grasshopper, in 1874 destroyed \$100,000,000 of the crops of Kansas, Missouri, Nebraska and Iowa and the indirect loss was probably much more. For many years the cotton caterpillar caused an annual average loss in the Southern states of \$15,000,000, while in 1868 and 1873 the loss reached \$30,000,000. The fly weevil, our most destructive enemy to stored grain particularly throughout the South, inflicts an annual loss to the whole country of \$40,000,000. The codling moth, the chief ravager of the apple and pear crops, destroys every year fruit valued at \$30,000,000 to \$40,000,000. The damage to live stock inflicted by the ox-bot, or ox-warble amounts to \$36,000,000." If it were possible to estimate the damage done by insects in South Africa, including the ever-present tick, the proportion, we believe would be much higher. The tsetse-fly alone, on the East coast, renders whole belts of country uninhabitable to stock.

FARM AND VELD.

SEASONABLE NOTES.

Lucerne when thoroughly cured, is as good a feed for cows as any forage crop which it is possible to raise. It is eagerly eaten, which proves that it is palatable to them.

Authorities in bacteriology claim that germs which develop and thrive in a low temperature give the off flavor to butter. During extreme hot weather the cream cannot be kept cool enough to prevent acids from accumulating.

It is said that cleanliness is next to godliness, and we know from experience that cleanliness is productive of good health in poultry. Fully half of all the diseases that poultry is heir to arises from neglect to keep the houses clean and dry and well ventilated. The yards also should be looked after and all decaying vegetable matter removed and plenty of slack lime used. We cannot be happy if we are unhealthy, neither can we be successful with poultry any way if our flock is diseased.

Always give the hens enough water. Especially is this necessary in the case of laying hens, as eggs are composed to a very large extent of water. This is one way of selling watered stock that is not dishonest. In the summer time there should be a full water supply for both the young and old hens. If there is danger of the chicks drowning in the water dishes that danger may be eliminated by putting a broken brick in each dish, upon which the chicks may climb in case of falling into the water.

In order to get the best and quickest returns from pigs, begin fattening them as soon as they are born. When the pigs begin to try to eat (and they will do this when only a few days old), fix a place where they can go and eat by themselves. First give them skim milk and then gradually add meal increasing the amount as the pig grows. As soon as they are large enough to eat it, add some mealies but they make the most rapid growth with meal—rye meal for preference—if they have plenty of milk to go with it.

One of the safest preventives against the highly objectionable habit possessed by some sows of eating their young is to keep the bowels of the animals rather lax as the time of parturition approaches. Some of our best authorities attribute this unnatural habit on the part of sows to a too feverish condition of the system, and in order to prevent it the administration of small doses of laxative medicine given at regular intervals for 10 days to a fortnight before the young are born, is often found productive of very satisfactory results.

Four splendid thoroughbred stallions have arrived at Bloemfontein for Government stud purposes. They were specially selected in England, and were brought out in charge of Mr. Chapman, son of the Duke of Westminster's head stud groom. The horses are Prince Barcaldine, winner of the Lincoln Handicap, Hermanus, Bullet, by Chainshot, the other, a dark brown is unnamed.

How to exercise the bull? is a question often raised. A good way, where there is no bullyard, is to use a twisted wire cable stretched between two heavy posts. The bull is fastened to a sliding ring on this wire and exercises the full length. The animal should be started at this form of exercise pretty early in life to get him used to it. He should be fastened by the ring in his nose. Six strands of galvanised fencing wire should be strong enough if twisted well together, and the wire should be high enough from the ground so that the bull cannot get his neck over it.

It is not always the cow with the best record as a milk producer that pays the best. Some excellent milkers are such heavy feeders that there is no profit in keeping them. Another animal with probably a similar good record for yield will be a comparatively

small feeder. Whatever she eats seems to go into milk or butter fat. A record of milk yield without a record of the daily feeding is of little value to any one. Those purchasing cows for dairying should keep these points before them. Another point that must be considered is the season of the year when the yields of butter, cream and milk have been made. A dairy cow that will make large yields in the summer and comparatively nothing in the fall and winter is far less valuable than another that keeps up a pretty steady yield the year round.

Griqualand East is, as we anticipated, looking to the Dairy Industry for the future. Butter and cheese making are growing in favour, and as the country favours stock rearing this industry should grow to large proportions once it makes a fair start. Mr. Louis D. Gibson, of the farm Kliprug, is a new recruit who has just started cheese making. He has imported four young shorthorn bulls from England, and intends giving special attention to the breeding and feeding of a good dairy herd. He is building a large silo for the purpose of conserving ensilage for winter feeding—a step forward which stamps him as not only progressive by instinct, but as capable of grasping the first essentials of success in the business he has taken in hand. It is a pity that the fine winter rains which fell in Griqualand East were not followed by the usual spring rains, as this threw the season back a bit and consequently the grazing for cattle, up to quite recently was rather short. Mr. Gibson is devoting the whole of his daily milk supply—some 30 gallons—to the manufacture of cheese.

Owing in a great measure to the demands of the mining industries in South Africa, and to the high rate of wages paid to labourers at the seaports, farmers in many parts of the country, have experienced considerable difficulty in obtaining sufficient native labour to work their farms in an efficient and economical manner. This fact alone, will perhaps induce stock-owners to seriously consider any method or appliance, which will in any way effect a reduction in the amount of manual labour in their farming operations.

Fencing and paddocking, largely reduces the number of herds required, for if the farm is securely fenced and sub-divided, one shepherd with the assistance of a good Collie dog, can attend to several flocks. Dipping tanks constructed on the plan adopted in the Australian Colonies (where large numbers of sheep have to be dealt with, and labour is excessively high) will also enable the farmer to dispense with several servants; for all the work of dipping can, with the improved appliances, be performed by two or at the most three men, and that without injury or hurt to the animals treated.

Drafting or sorting kraals again, effect an immense saving of labour as well as material, and as every farmer can construct one in a short time, and at very little cost, we propose to give a few hints on the subject, in the hope that these remarks may be put to a practical test. There are a few farmers in this Colony who have built drafting kraals, and if these men are questioned as to their value and saving of labour, they will answer, that they do not consider sheep farming can be properly carried on without the use of the sorting kraal. On the majority of farms the usual method adopted when sheep have to be separated, is, for the flock to be driven into a kraal and each animal caught at the expense of much labour and driving, as well as injury to the animals. All this can be obviated by the use of the drafting kraal, the construction of which is simple and inexpensive.

To commence with the shedder should be from 18 to 24 feet in length, and consists of two boarded walls 3 feet 6 inches in height placed parallel to each other, 12 inches apart at the bottom and 20 inches at the top. At the opening of the shedder a few hurdles are placed in the form of the letter V inverted in order that the flock may be kept in front of the opening into which they are easily led by one or two well-trained goats.

Three feet beyond the exit of the shedder, is a swing gate fixed to a post planted opposite to the centre of the shedder, so that the door commands the entrance to two kraals. If the gate is provided with a strong spring, the man controlling the opening or closing, can by the use of a string stand fairly far back and thus in no way frighten the sheep from moving up the shedder. The number of kraals and gates can be increased according to the stock to be dealt with, but this is a matter for the farmer to decide when constructing his drafting kraals. One point should not however, be lost sight of, and that is, the entrance to the shedder should be on slightly raised ground so that the sheep moving along may be always in view of the remainder of the flock.

The use of the drafting kraal will be found to be invaluable, especially when sorting ewes from wethers; weaning lambs, or separating flocks which may have become mixed together. The ease and rapidity with which the work can be performed is astonishing, especially when sheep have once become accustomed to passing along the shedder. Farmers who have already erected drafting kraals on their farms will be able to give the approximate cost of construction; but if the required kraals already exist, the shedder, gate and hurdles can be put up in a day at the cost of a few shillings.

The excessive rains during last winter, it appears now had an unfavourable and destructive influence on fruit trees, in the Western Province

particularly peach, plum and apricot trees as many of them died with the beginning of summer. The dying of so many trees in the neighbouring orchards caused quite a stir among fruit-growers as they suspected at the first a new disease. Fortunately, no alarm need to be taken on that account as it has satisfactorily been proven that the dying was due to excess of moisture and want of drainage.

The Department had several trees examined and in each case death could be readily traced to the destruction of the entire root system on account of the above conditions. The trees, which had died, exhibited the same symptoms. They started growing in the usual way with the beginning of Spring but after a few weeks, usually after flowering and the formation of a few leaves, the trees died more or less suddenly when the store of plantfood present in the trees themselves had been exhausted and the roots were incapable of providing new supplies, having suffered and died during the preceding winter months.

In most instances this dying of trees occurred in low-lying lands, but in a few cases trees on slopes have suffered equally on account of the roots of such trees not having been able to penetrate a hardpan, consisting of a gravelly clay, at a depth of about 24 inches. It may be reasonably assumed that the same hardpan was equally impenetrable to water so that the latter accumulated and caused practically the drowning of the trees as with some of the roots decay had already set in.

Prospects of a good and plentiful fruit-crop have greatly lessened during the past month in consequence of the rain and cold weather having continued too long. In some instances the rain, having set in during the flowering period, is responsible for the destruction of the entire crop of Japanese plums and in others for the failure of pears. Rain and cold together caused a check on vegetation with the result that a portion of the fruit already set dropped off the trees on account of being badly nourished. As matters stand at present, the apricot crop will be poor; Japanese plums and prunes vary, being highly satisfactory in some instances and disappointing in others. The peach and pear crop will be moderate but there is a possibility of quality making up to some extent for quantity as trees do not bear heavily so that the individual fruit has more chance of development. Apples and grapes are still promising but should this unfavourable weather continue much longer the latter must suffer heavily in the same way as fruit has already suffered.

Owing to the same conditions of weather, the cultivation of vineyards and orchards is on the whole backward, grass is plentiful, insects and pests abundant, of the latter one can mention the shot hole fungus, the curl leaf, the rust in the vines and the Powdery Mildew of the apple, a very rare occurrence in ordinary years. As

this fungus belongs to the same group to which *Oidium* belongs, spreading its mycelium over the surface of the attacked organs, sulphuring is equally effective.

A recent bulletin from the Department of Agriculture, Washington, is devoted to remedies for worms in sheep and other animals. One remedy recommended for round, wire and other small worms that infest the stomach is coal-tar creosote, 1 oz.; water 99 ozs. Of this solution give to lambs 4 to 12 months old 2 to 4 oz.; yearling sheep, 3 to 5 oz.; calves, 3 to 8 months old, 5 to 10 oz.; yearlings, one pint; two year-olds and over, one quart. One dose will usually suffice, but if not, repeat in about a week. Be sure that the animals swallow the remedy, if it enters the lungs death may result. This is a cheap remedy. In very stubborn cases, or where bowel or hook worms are present, from 30 to 80 grains thymol may be added to the dose of foregoing solution. Add the thymol to each dose, according to size of animal, after it is measured. Thymol must be in crystal form, and not run together in a mess in the bottle. Get the druggist to show how much 30 grains is, which will aid in preparing the larger doses.

Dairy farmers should note that care of the cow pays well in the end. The good dairyman feeds his cattle well and looks after their comfort. And the first of these is warmth in the winter. Coarse rugs are not dear and as their warmth has a direct influence on the milk supply they soon pay for themselves. In Australia, many dairy farmers practice rugging and report favourably on it; in fact it is expected to extend with rapidity.

It is claimed for a Montevidean farmer named Tidemann, that he has "discovered," a simple but certain cure for worms in sheep. This is to keep them from 48 to 60 hours without water, and then give them to drink a solution of common salt in the proportion of 20lb. to 26lb. for each 100 quarts of water, about half a pint being sufficient for each animal. Two hours after taking this they may be given fresh water. Too much salt water is apt to kill the animals, but, so far, Mr. Tidemann has only lost four for each 1,000 cured. We fear Mr. Tidemann's "discovery" was anticipated years ago in South Africa. The late Mr. Hillier, and many others interested in farming matters in this Colony, believed strongly in the efficacy of common salt, when properly administered, as a cure for wire-worm in sheep—*Strongylus Contortus*. Mr. Hutcheon, C.V.S., tried it and found the difficulty to be in administering the remedy. In practice it is most difficult to pour the liquid directly into the stomach. Although not meeting with success in experimenting with salt as a cure for wire-worms Mr. Hutcheon always recommended its free use as one of the most essential preventives of internal parasites.

THE DESTRUCTION OF RAMMENAS

And Similar Weeds.

BY HUGH C. SAMPSON, B.Sc., &c

Rammenas or Wild Radish and allied weeds, such as the Wild Mustards and Turnips are found all the world over, and are amongst perhaps the worst enemies the farmer has to deal with. Though only an annual the wild Radish sows itself so readily that unless dealt with, it will soon spread and establish itself permanently. The damage done may briefly be stated as follows:—

Being a vigorous and rapid grower it soon overtakes the young corn crop. Its foliage prevents the crop from having free access to the air. It keeps the rain and dew from reaching the soil, and what moisture there is present in the surface soil, is mostly absorbed by the roots of this unwelcome guest, and along with it the valuable food constituents which should go to feed the crop. Indirect damage may also be caused by harbouring insect and fungoid pests.

Rammenas, or as it is sometimes called, Jointed Charlock is really the Wild Radish (*Raphanis Raphanistrum*), and in general appearance it closely resembles the cultivated variety when it has run to seed. The stem and leaves are rough. The flowers are pale yellow or occasionally purple and as they fade turn almost white. The fruit or pods are peculiar, instead of opening in the usual way by splitting along the longitudinal joints, they break off into small joints or sections, each section being about the size of a barley grain. These sections each contain a single seed, and being very hard, do not break when threshed. They are often found in samples of corn from which it is very difficult to separate them. Thus the weed can, and often does, spread from one field to another in the seed corn. Therefore great care should be taken to examine the sample, to see that no impurities such as this are present.

METHODS OF DESTRUCTION.

1. If the plants are not too thick in the crop, hand-pulling is the best method to adopt, this however should be done before the plant is in flower, as the pods when fully formed break off very easily, and so the ground is again sown with its seed only to come up again the following year.

2. The land may also be bare-fallowed but at the same time should be worked at intervals, so that the Rammenas seeds may start growing, while subsequent working of the ground will pull the plants

up to be soon withered by the sun. Bare-fallowing without working the land would be absolutely useless, as a large percentage of the seeds would lie dormant in the soil, only to spring up when the land is again worked for a crop.

3. If the Rammenas is too thick on the ground for hand-pulling, spraying with Copper Sulphate (Blue Stone) solution might be tried. This method has already been tried in England, America and the Continent with remarkable success and will soon be the method generally adopted to destroy this and similar weeds.

The strength of solution usually used in England is from 2 to 4 per cent., varying with the season and the vigour of the crop. As no experiments of this description have yet been tried in the Colony, it would be best to use the weak 2 per cent., or an even weaker solution to suit the drier climate.

The method of preparing a 2 per cent. solution is as follows:—10 lbs. of Copper Sulphate are placed in the bottom of a wooden barrel or tub and on this are poured three or four gallons of hot water. This is stirred till all is dissolved and then cold water is added to make the whole up to fifty gallons. This quantity is sufficient to spray one acre.

In working with Copper Sulphate care should be taken to use only copper or wooden vessels, as the solution corrodes iron. The barrel of the sprayer should also be made of either wood or copper.

This method is really much cheaper than hand pulling as the cost of material with Copper Sulphate at 3d. per lb., is only 2s. 6d. per acre.

The spray falling on the rough leaves of the Rammenas does not run off. The oats or wheat though slightly damaged at the time soon pick up again and are much stronger than previous to spraying while the weed withers and dies. A calm day in settled weather should be chosen for this operation, which should be done when the plant is still young and succulent, that is before flowering.

ANOTHER WEED PEST.

Recently another weed very much similar in general appearance to the above has been noticed in the Colony. This is the Wild Swede or Smooth-leaved Charlock (*Brassica Campestris*.) The stem and leaves of this plant are smooth being covered with a bloom like that on a cabbage leaf. The flowers heads are more compact, and the flower is much smaller and of a deeper yellow than the above. The pods when ripe very readily split longitudinally and shed their seed, each pod containing from twelve to twenty seeds. The seeds are small and round resembling those of the cultivated swede or turnip and owing to their oily covering can remain sound in the soil for many years, only starting to grow when again brought near the surface. To give some idea of the vitality of the seed in England, fields which have been down to grass for more than eighty years have been literally smothered with this weed when again ploughed up.

The seed of this plant seems to have been imported as an impurity in seed oats. You find the plant growing in oat crops which are beyond the reach of traffic either by road or rail. It and other weeds seem also to have been introduced in compressed forage as you may find them springing up where horses have been fed with it.

There is no reason why this seed should be sown as it can be very easily got rid of by riddling or winnowing the oats before sowing.

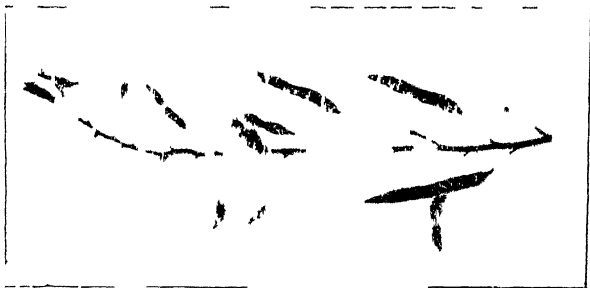
The only method of eradicating this weed is by hand-pulling. Spraying is useless in this case as the spray runs off the smooth leaf before it can take effect.

The weeding should be done if possible before flowering, as a healthy plant is capable of producing 1,000 or more seeds. Supposing only 10 per cent., of these came up the following year there would be 100 plants to account for and the work would soon get quite out of hand.

To prevent the importation of this and other weed seeds and at the same time to procure the importation of reliable seed, an obvious method would be to institute a Government Seed Control Station, to which farmers could send samples of their seed to be tested for:—

1. The percentage of weed seeds, impurities, and adulterations.
2. The Germinating Capacity. That is the percentage of seeds which are capable of growing or germinating.
3. The Germinative Energy. That is the length of time it takes for the seed to germinate. Old seed takes much longer to germinate or start growing than fresh, and at the same time the young plant is much weaker. Therefore, if such were sown the brand would take longer to appear and with uncertain seasons would greatly increase the risk of the crop.
4. This might at the same time check the importation of several insect pests, such as the Bean Seed weevil, the Hessian Fly and others which are often found in seeds.

Such a station would to some extent help to bring about the same conditions of the seed market as competition has done in England, and might induce importers to adopt special seed cleaning and dressing machinery and thus raise generally the standard of seed in the Colony.



Seed Pods of Wild Radish.



Rammen's or Wild Radish.



Wild Swede.

HARVESTING COMPETITION AT ELSENBURG.

The harvesting competition held at Elsenburg, on Saturday the 15th ult., attracted a large and distinguished company of visitors. The Western Province Agricultural Society arranged the contest and offered a silver cup for the successful competitor. By arrangement with the Colonial Secretary (Sir Pieter Faure) two trials took place in the oat crops at the Government Agricultural School on the farm Elsenburg, which adjoins the Mulder's Vlei railway station. Among those present who all took the keenest possible interest in the contest were, H.E. the Governor, Sir W. Hely-Hutchinson; the Chief Justice, Sir Henry de Villiers; the Colonial Secretary, Sir Pieter Faure; the Secretary for Agriculture, the Hon. John Frost, M.L.A.; General Sir E. Y. Brabant, M.L.A.; Mr. J. T. Molteno, M.L.A.; Mr. H. Cloete, M.L.A.; Mr. C. Currey (Under Secretary for Agriculture); Mr. C. W. Broers, A.R.M. and others. The Western Province Agricultural Society was represented by Mr. A. Barry (Vice-President), Mr. F. Plant, Mr. L. Cloete, Mr. C. Sedgwick, Mr. A. Blackburn and Mr. Percy Wenhan (Secretary). A number of farmers from the district were also present, and a couple from the far Midlands, so the audience could be described as thoroughly representative.

The judges were Dr Nobbs, of the Agricultural Department, and Mr. Mason principal of the Agricultural School assisted by Mr. Stark.

The entrants for the competition were four, as under :—

(1) "The McCormick," built by the McCormick Harvesting Machine Co., Chicago, U.S.A., and exhibited by Messrs. Smuts and Koch, Malmesbury.

(2) "The Deering Ideal," Deering Harvester Company, Chicago, U.S.A., shown by Lloyds and Company, Cape Town.

(3) "The Wood," Walter A. Wood, London, exhibited by Mr. Porter, Cape Town: and

(4) "The Osborne," constructed by D. M. Osborne and Co., Auburn, U.S.A., and exhibited by George Findlay and Co., Grave Street, Cape Town.

The conditions of the trial were decided practically on three points, viz., (1) Result of work; (2) Mechanical simplicity (3) Lightness of draught combined with strength of construction.

Each machine was given a four acre plot to work on and at a given signal, all being ready, a start was made simultaneously at about 11.30 a.m. Early in the run the Wood machine faulted and shortly after it was apparent that the Osborne was not going

smoothly. There were very apparent reasons for the troubles. The Wood was a machine which has seen excellent service in its day—but that day has been a fairly long one. The Osborne, on the other hand seemed a bit too new and was scarcely running freely on her bearings. Beside this, these two machines were working in the heaviest section of the crop and the Osborne was not at all well-driven. All things being equal—that is if it were possible to make the conditions exactly the same in such a trial—the probabilities are that there would be very little to choose between the contestants; but as the circumstances went, the McCormick and the Deering got well ahead and kept there. At one time it seemed difficult to say which of these two excellent machines was doing the best work so evenly and uninterruptedly did they continue on their course. Then the McCormick faulted slightly, and the Deering came to a standstill. Then some other little trouble occurred, and the McCormick began shedding unbound sheaves. But nothing sufficed to keep the machines long at a standstill and the work was rapidly brought to a close after about an hour's run. The McCormick, with its deep swath of seven feet at a cut had a great advantage over the other machines and came in a fairly easy first as regards time. But the extra foot had to be deducted which brought down the record nearer the average, and then the judges had to consider the other points. These included a short run by the McCormick and Deering in the heavier crop higher up the hill, and a general examination of the details of each machine. Up to this it seemed to be a toss up between the Deering and McCormick but in the end the latter was awarded the silver cup, the former being placed a good second.

The conditions under which the trials were carried out may be accepted as fairly satisfactory, inasmuch, as they were typical of the average conditions under which the machines are usually expected to work in this Colony. Without claiming the test to have been in any sense final—such tests never can be final from the very nature of thing—the results should prove both valuable and instructive to the farming community, and the Western Province Agricultural Society is to be congratulated upon the success which attended its efforts.

THE LUNCHEON.

On the completion of the tests the company repaired to the College and sat down to luncheon.

Sir P. Faure proposed the health of the Governor, and, in a few well-chosen sentences, pointed out how valuable were visits from the representative of His Majesty in cementing the good feeling between the King and his subjects. It was important that the Governor and governed should be acquainted with each other as much as possible, and he was sure that Sir Walter's action in coming out and meeting the farmers in that way was very much appreciated. He was very glad indeed that His Excellency proposed to make a tour of the

Western Province in order to meet as many as possible of the inhabitants, and to become more fully conversant with the Colony of which he was the head.

His Excellency, in reply, said he had come out to see a practical demonstration of rearing and binding, and he, therefore, did not propose to inflict upon them an oration. He entirely endorsed all that Sir P. Faure had said as to the duties of a Governor in relation to those over whom he was set in authority. It would be a great pleasure to him to travel about the Western Province and see what he could do for the farmers and the farming interests there, and he hoped to derive much profit—not pecuniary profit, of course—(laughter)—as well as pleasure from his tour.

Mr. H. Cloete, M.L.A., tendered on behalf of the Western Province Agricultural Society acknowledgements to the Government for having entertained them in such an admirable way.

Sir P. Faure, in replying, said that they were glad to find that the advantages offered by the Agricultural School were now being made use of more largely. During the time of the regrettable war the number of students went down to 24, but it was gratifying to be able to say that to-day the number had risen to close upon 60. (Applause). The Government were making provisions for receiving 70 students. Not only were the young men who were receiving instruction in the College drawn from our own Colony, but there were also representatives of the neighbouring Colony and the sister Colony, and actually students from England, who had come to try their luck in South Africa, and who wished to acquaint themselves with the conditions of farming in this country before they embarked upon their career as agriculturists.

Mr. Mason, the principal, also added a few words. He was pleased that the Government had seen fit to give them an extra grant for machinery and implements. They would have noticed that this was a feature in which the school was sadly lacking, and he hoped in due course that it would be equipped with a thorough mechanical and engineering department. He trusted that the liberal frame of mind adopted by the Government towards the School would be continued so that in process of time it might be placed in a position to efficiently fulfil those duties which such an institution owed to a country so largely devoted to agriculture. (Applause).

The Judges' Report.

The following is the Judges' report :—With reference to the trial of binders held at Elsenburg on the 15th inst. at which we had the honour to act as judges, we have pleasure in stating that in our opinion the McCormick machine exhibited by Messrs. Smuts and Koch of Malmesbury, merits the first place and therewith the silver cup offered by your Society and we recommend that a certificate, in

recognition of its good work should be given to the Deering Harvester, exhibited by Messrs. Lloyds & Co. of Cape Town.

The work done by the various machines, was on the whole, very satisfactory, though we consider that some of the machines left a too long stubble, whilst others would undoubtedly have given better results had they been in the hands of more experienced workmen and drawn by mules accustomed to the work.

Signed } WM. G. MASON,
W. STARKE,
ERIC A. NOBES,

The Secretary,
Western Province Agricultural Society,
Cape Town.

CUZCO MAIZE AT THE CAPE.

Another Report.

In connection with the trials of the Peruvian mealies known as Cuzco Maize, in this Colony, the following additional report has been received by the Agricultural Department:—

Mr. J. S. Anderson, Forester, writes from Evelyn Valley under date September 29:—

My report on the trial sowing of Cuzco Maize has purposely been delayed until I could say definitely how the small amount of grain formed on the cobs was to turn out. As reported under date 25th October, 1901, the mealies were received here on the 15th and were carefully planted by hand on the 19th and 21st of the same month. Seventy four seeds were planted 3 ft. x 3 ft. in a portion of the vegetable garden with a good dressing of stable manure, 233 seeds were planted 3 ft. x 3 ft. in the nursery with a little fowl manure well forked in, and mixed with the soil at each seed. The seeds germinated well but about a third of the plants were destroyed by grubs while still small.

The nursery plants attained a height of three to four feet, only four of the plants formed cobs, none of which carried any grain, this portion therefore was a complete failure.

The plants in the garden averaged about eight feet in height, about half of them formed cobs, but only twelve cobs produced grain, none of the cobs exceeded 6 inches in length and none of them were more than half covered with grain some having only a few grains, the grain, owing to its open growth on the cob, was round instead of flat, only a small portion of it would equal the original seed in size, the majority being smaller. The seed appeared to be very backward in ripening and on that account the cobs were allowed to remain on the

stalks up till the beginning of the present month, in expectation that the grain would dry and harden, but even then, the grain was quite soft and wet, the cobs were then removed from the stalks and hung up to dry. On examination a week ago the grain proved to be still soft and moist but I observed that three of the grains had sprouted on the cobs. Ground was at once prepared where potatoes had recently been raised, and the mealies were planted on the 25th. This ground had been well manured with kraal dung for the potatoes, and before ploughing now had a light dressing of fowl manure.

310 grains of corn were obtained (about exactly the original seed) and planted now, but owing to its unripe appearance a good germination is very doubtful. I think, however, if any should reach maturity a better result may be anticipated, they appear to require a longer growing season than the Colonial Mealie and being planted four weeks earlier this season than last, should be in their favour in that respect, although on the other hand the early planted mealies generally suffer most from the attacks of grubs.

The results of the trial seems to show that, planted at the usual planting season, the Cuzco Maize has not a long enough time to mature and ripen the grain, the present season should prove whether they will succeed when planted early enough to secure for them the extra time they appear to require.

The Cuzco Maize appears to be of very weakly growth, the stalks being thin and slender with too little growth to sustain them upright.

The past season was a favourable one for mealies at Evelyn Valley, the ground was in good condition at the time of planting, and sufficient rain fell throughout the growing season, Colonial Mealies having done well.

ELECTRO-CULTURE IN CLIFTON.

M. Pinot De Moira's Experiments.

Many of our readers in agriculture (remarks *The Bristol Times* in a recent issue), will no doubt remember that about four years ago we published some information respecting the experiments which M. Pinot de Moira, of Clifton Wood, was then instituting in the system of electro-culture. Though well known and adopted in France, electro-culture was comparatively a novelty in this country, and it had to encounter the suspicion and distrust which are usually entertained towards new-fangled ideas. There is, however, nothing very extraordinary or complicated in the methods; on the contrary, the instrument employed—known as the *géomagnétifère*—is simplicity itself, and may be made for a few shillings. It consists of a long pole stuck in the ground, surmounted by a crown of five or six red copper-pointed

wires, two feet long, which collect the atmospheric electricity and disseminate it into the soil by means of a central wire connected at right angles on both sides with a certain number of other wires two yards distant from each other, which are submerged about 15 inches in the ground. The central wire, or principal conductor, is about one-sixth of an inch thick, and the transverse wires about one-eighth of an inch, and are of galvanised iron. The pole must be higher than, and as far as possible removed from, any tree grown on the same area. The whole apparatus is, in fact, a small lightning conductor. Having thus briefly described the contrivance, we may proceed to state some of the results of M. de Moir's experiments. He has in his garden a "géo," as it is called, of which the underground wires pass under the roots of some vines and also of a bed of tomatoes, and, whether the result be due to electro-culture or not, there can be not the slightest doubt that both the vines and the tomatoes, notwithstanding the unfavourable season, have grown remarkably well. The vines are loaded with bunches of grapes of good size, and the tomato plants are weighed down with their clusters, some of which are singularly fine specimens. In another part of the garden are vines growing without the aid of a "géo." but in a similar position and under equally advantageous conditions otherwise. It is evident at a glance, however, that the fruit is far behind that growing on the vines which are under influence of the "géo." For the purpose of comparing the tomatoes with those grown under ordinary conditions, M. de Moira took our representative to the gardens of the Right Hon. Lewis Fry's residence, Goldney House, the management of which is in the able and experienced hands of Mr. Howe, a well-known judge at local flower shows. The contrast was obvious. Though the tomatoes grown by Mr. Howe were a good crop, and were, moreover, of the same seed, which is a very important factor, they would not bear a moment's comparison with those of M. de Moira. It should be added that M. de Moira has obtained equally good results in cauliflowers, potatoes, celery, and other vegetables every year since he began his experiments. There seems, then, a strong *prima-facie* case for the belief that the difference is attributable to electro-culture. When the subject was discussed by the British Association in Bristol in 1898, Lord Kelvin, who had visited M. de Moira's garden and who did not in the least deny the difference between the crops, hinted that, in his opinion, it was due to the digging of the ground necessitated by the laying of the wires. Considering, however, that these were laid in narrow slits made with a spade with very little disturbance of the soil, and also that the excellence of the results has continued every year, though the wires have not since been touched by anyone, there seems to be very little reason for this suggestion. It is sometimes said that agriculturists are, as a body, too much attached to the routine of their forefathers, and that may to some extent be true; but sometimes also the great savants who give lessons in agriculture according to experiments made in their laboratories have never put their hands to a plough or even to a spade.

ERINOSIS IN VINES.

The attention of vine-farmers is again directed to the existence of Erinosis or Phytoptus Vitis. The deformation of the leaves, as shown in the accompanying illustrations, is due to the presence of a small tiny mite living in the hollow patches on the under side corresponding to the characteristic swellings on the upper surface.

It appears that the pest has spread through the Stellenbosch district, and has by means of cuttings and grafted vines been carried to other parts.

Though the pest is not directly detrimental in the same way as other pests, it stands to reason that it must do damage in the long run if left to spread and continue unchecked. Unfortunately nothing can be done during summer except sulphuring, provided care is taken to apply the sulphur in such a way that it will reach the under side of the leaves.

In one instance where sulphuring has repeatedly been practised since the vines began to shoot the treatment had a marked effect.

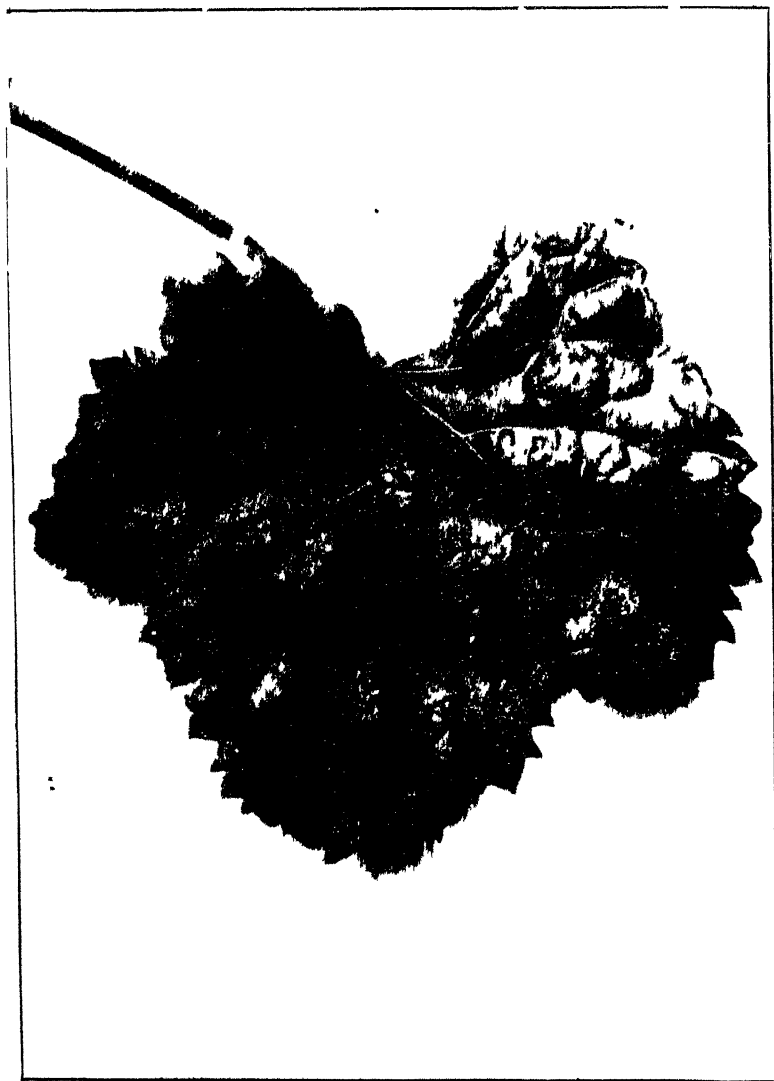
C. M.

RINDERPEST STATISTICS

AS BROUGHT UP TO NOVEMBER 25th, 1902.

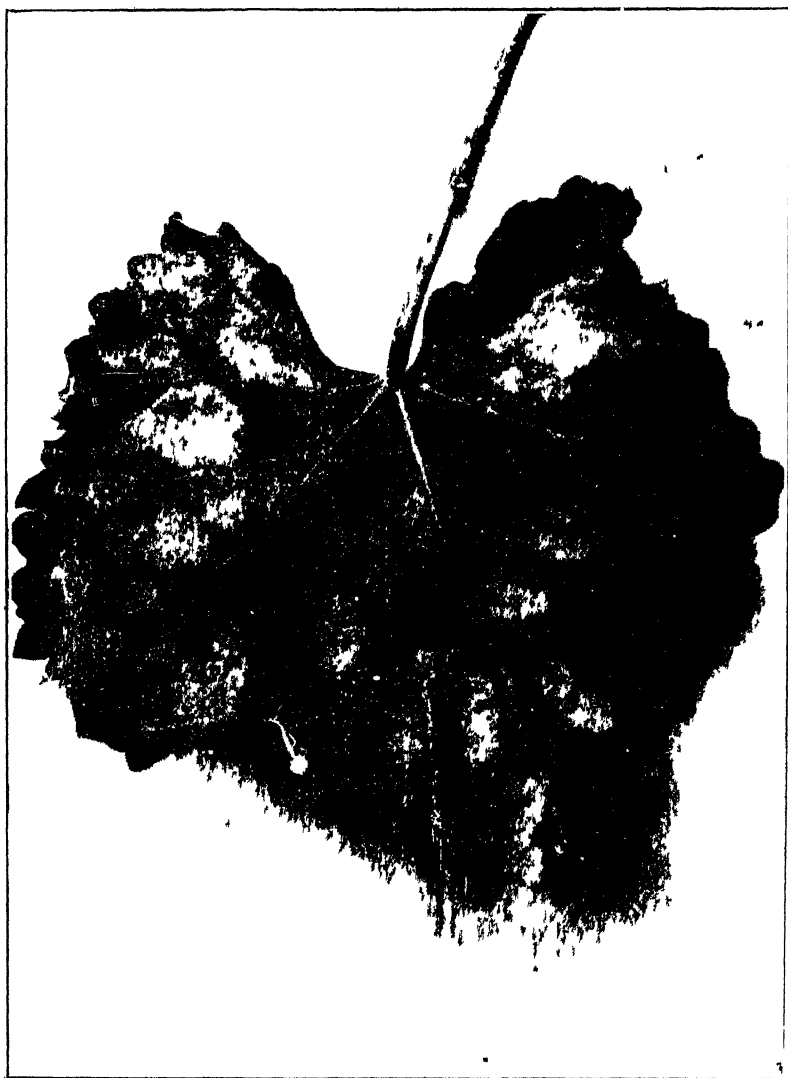
District	No. of centres still quarantined	Approximate total loss since com- mencement of outbreak	No. of cattle in affected herds	Percentage of Mortality
Aliwal North	1	210	628	33 Per cent.
Albert	1	109	1397	7 do
Barkly East	1	353	1161	30 do
Barkly West	nil.	4	70	5 do
East London	1	52	750	6 do
Elliot	2	111	628	17 do
Engcobo	14	278	2389	11 do
Glen Grey	1	114	835	13 do
Hay	2	130	483	29 do
Heidelberg	3	79	431	18 do
Herschel	nil.	636	4598	13 do
Kimberley	1	11	223	4 do
Maclear	1	38	107	35 do
Mafeking	2	1577	6913	22 do
Queenstown	1	21	95	22 do
Taungs	1	508	3067	16 do
Tsomo	2	6	106	5 do
Umtata	1	22	65	38 do
Vryburg	nil.	228	1311	17 do
Wodehouse	5	171	1965	8 do
Xalanga	5	9	115	7 do
21	45	4662	27292	17.08 Per cent.

Upon a comparison with the Statistical Return rendered to October 23rd, it will be seen that 778 additional cases and 149 deaths have occurred during the period October 23rd to November 25th. The number of affected areas, however, has been reduced from 77 to 45.



Erinosis or Phytioptus Vitis.

Affected Leaf from above



Erinosis or Phytioptus Vitis.
Affected Leaf from underneath

HEREDITY AND VARIATION.

IN-AND-IN BREEDING.

Plant Variation and Deterioration of Named Sorts.

Degeneration of Cultivated Annual and Biennial Seed Plants.

Science and the Farmer.

A Comprehensive Correspondence.

Some weeks back the following letter was addressed to the Editor of the Agricultural Journal, by Mr. Robert Warren, of Avoca, Kei Road:—

Sir,—I should like an authoritative opinion from the Veterinary Branch of the Agricultural Department on the following points.

“In-and-in breeding” has been used to a considerable extent to build up stud herds and flocks. Is the virility and stamina of such herds and flocks maintained for any length of time, or are they only useful to stamp their qualities on their progeny when introduced into other herds and flocks?

Has “in-and-in breeding” been used to the same extent in studs of thoroughbred horses?

Nature has her own laws, both in the animal and vegetable kingdom. Pure bred wheat only lasts a few years. Goldenball, Danzig, German kaalkop, and other varieties have gone; so has the once famous German blue potato, as well as some other varieties, after a few years of usefulness.

As our correspondent, whether consciously or unconsciously we cannot say, opened up the broadest possible issues which scientists and cultivators combined could select for discussion, and as these questions are of vital importance to all who have to make their living out of the land, we submitted them to various authorities for treatment. The result is attached in the form of what are really three able articles dealing with the complex questions raised in as simple and succinct a form as possible. In the continued absence of the Colonial Veterinary Surgeon (Mr. Hutcheon) on Rinderpest work, the veterinary questions were submitted to Mr. W. Robertson, M.R.C.V.S., whose able contribution is the first on the list. The others speak for themselves.

In-and-In Breeding : Effects and Influences.

The gain in constitutional vigour derived from an occasional cross between individuals of the same variety, but belonging to distinct families, or between distinct varieties has not been so largely or so frequently discussed as have the evil effects of too close in-breeding.

The evil effects resulting from close inter-breeding are difficult to detect, for they accumulate slowly, and differ much in degree with different species, and, while using the term *evil results*, it should be noted that the advantage of close interbreeding in maintaining character is indisputable, and often outweighs the evil of a slight loss of constitutional vigour.

The consequences of close interbreeding carried on for too long a time are, as is generally believed, loss of size, constitutional vigour, and fertility, accompanied by a tendency to malformation, but it is the opinion of authorities that these evil effects can be mitigated by separating the related individuals for a short time, and submitting them to changed or altered conditions of life.

That any evil directly follows from the closest interbreeding has been denied by many persons, but rarely by any practical breeder, and never by one who has largely bred animals which propagate their kind quickly. Evidences of the evil effects of close interbreeding can most readily be acquired in the case of animals such as fowls and pigeons, and almost any good breeder of such stock is conscious of the value which accrues from an occasional cross with another strain of the same variety. Many breeders, to avoid the expense of purchasing such crosses, keep two sets of live stock, and occasionally cross one in the other.

With cattle close interbreeding can be carried on for a lengthy period of time with advantage in respect to external characteristics and with no manifest deleterious constitutional symptoms. This can be proved by a perusal of the Shorthorn stud-book of one notable case in which a famous Bull, himself the offspring of a half-brother and sister, was mated with his own daughter, grand-daughter, and great grand-daughter, so that the produce of this last union or the great great grand-daughter had $\frac{15}{16}$ ths or 93.75 per cent. of the blood of the original bull in her veins, and this great-great-grand-daughter was mated with a bull having 68.75 per cent. of the same blood and yielded valuable offspring.

The opinion of a celebrated breeder is worth quoting. "To breed in-and-in from a bad stock was ruin and devastation, but that the practice may be safely followed within certain limits when the parents so related are descended from first class animals."

Though close interbreeding may be carried on in a herd without detriment to the individual animal if we select the best animal for the purpose (as Nature does by the law of combat) there is no doubt of the advantage to be gained from a judicious cross, which advantage at once shews itself in the greater size and vigour of the

offspring ; such crosses are extremely valuable as a means of procuring slaughter animals and such as are seen in the entries in the Fat Stock class at certain shows.

The wild cattle at Chillingham Park and elsewhere have been quoted in support of the theory that long continued interbreeding does not deteriorate a herd, this might be due to the selection (by strength and vigour) of the sires. The weak and old bulls getting no chance to procreate their infirmities and deformities ; but from the records of the increase in this herd there seems no doubt that they are less fertile than the herds on the South American Estancias where crossing is common, and they have certainly deteriorated in size, being (as they are) the descendants of the gigantic *Bos Primogenis*.

IN SHEEP

herds can be kept pure and up to type by close interbreeding, and continue so for many years, but crosses are employed where certain characteristics or traits are required to be brought into prominence, be it increase in quantity or quality of wool, or greater flesh carrying capacity. In some cases it has been advocated by certain authorities that a pure bred variety can be crossed by a different pure variety in order to give prominence to a certain point ; for instance, during the past few years, as any frequenter of shows can tell, the types of dogs adorning the benches have undergone a change from their predecessors of twenty years ago, and the endeavour to attain superiority in their special lines (now judging by points is so common) have caused breeders to try all sorts of experiments to gain their end. In the case of the collie, for instance, where a flat-head, thin tapering muzzle and low set on ears is the ideal aimed at, some even have advised crossing once with a Barzor (wolf hound) which possesses the muzzle and skull &c., so beloved by ardent admirers of the present stamp of collie. There are many other theories of a similar type advocated and believed in, but proofs as to their utility are not always forthcoming.

It is much to be regretted that our writers on zoology have not, instead of the Sheep, Pig, Cattle or Cart Horse chosen the Thoroughbred Horse as the basis of their investigations in regard to the effects, evil or otherwise, of close in-breeding.

No species of animal in creation is so specially adapted for that purpose, for here incontestable facts, and the accumulated statistics of the Racing Calendar, collected during a space of more than one hundred and seventy years, are available as incontrovertible evidence, whereas in breeding spheres selected and treated on by zoologists much must naturally depend on personal opinion, unreliable information, statements copied from other authors, and similar unsupported assertions.

The origin of the English thoroughbred is carried back to three Oriental ancestors, viz., "The Byerley Turk" "The Darley Arabian" and the "Godolphin Arabian."

It is a common custom to regard all living thoroughbreds as descended from one of these three sires in a direct male line, the maternal descent being a matter of secondary consideration. It is necessary here to come to an understanding as to the meaning, with regard to the thoroughbred, of the term *in-breeding*. Lehnendorff and most authorities are of opinion that "a horse should only be termed inbred when in sum total less than four degrees lay between its parents and their common ancestor, in other words, when the children or grand children of a stallion are mated, I call their produce *inbred*, but this term does not apply to the produce of great grandchildren of the common ancestor."

Now, if we consider the question what sort of crosses in the different strains of blood have recommended themselves as most desirable—although within the thoroughbred race there cannot, properly speaking, be any question of a cross as understood in zoology, because the whole breed is more or less related—we naturally come to the conclusion that the breeder is involuntarily forced into breeding within close relationship by the endeavour to adhere to the families of established reputation, and within them to use for his purpose none but the most prominent members.

In the commencement of the race we notice many cases of incest, logically accounted for, however, by the desire to mate the then existing and not too numerous individuals of tried excellence, and thereby perpetuate that quality. Opinions as to whether relationship in parents is advantageous, and if so to what degree, and when it begins to be injurious, differ very much even in our own days in England (Lehnendorff). The thoroughbred is specially adapted as a field for this experiment, as the value of certain crosses or the value of breeding from relatives, are proved in public, but it must not be taken for granted that in the case of a thoroughbred, a good racing record assures good colts. Several of the fastest horses of their day have proved themselves failures at the stud because they lacked the individual power to transfer their racing qualities to their descendants. More recently the mating of very nearly connected stallions and mares have frequently been tried experimentally in England, but generally with the old result—failure.

Careful search through the Stud-Book shows that it is not advisable nor common to mate closely related stallions and mares, as the number of reliable breeding animals to select from has rendered such a course (for preservation of type) unnecessary. If the Stud-Book records be consulted, it will be noticed that the progeny of parents once removed were neither such good performers on the turf or such successes at the stud as the offsprings of parents five or six times removed.

W. ROBERTSON, M.R.C.V.S.

Variation among Plants, and Deterioration of Named Sorts.

In discussing this subject we must start with the admission that the plants now constituting the vegetable covering of the earth are the descendants of very different forms existing in previous geologic ages, and that they have assumed their present specific identity by reason of an inherent power of slight variation to suit the conditions of their environment. Given a physical change upon the earth, the plants upon it had to adapt themselves thereto. If they were unable to meet the altered conditions by a corresponding change of structure or habit, they died out. The forms which we now see around us are just as capable of variation as were their ancestors, and a large part of the cultivator's art consists in observing such variations as promise increased value to mankind, selecting them from the multitude, and perpetuating them. Without this artificial aid, the variety would speedily throw back to the average type and disappear altogether. And the cultivator goes a step further. Besides eliminating and perpetuating chance varieties found among thousands of usual form, he argues that it will be possible, of set purpose, to alter the prevailing conditions of growth; for instance, to sow at an unusual season, to supply unusual fertilizers, and in other ways incite to variation. All results so obtained are carefully scrutinized. Whatever slightly differing form seems to promise well and shows betterment over the prevailing type, that is, seems to be more useful to man, is cultivated apart, its seed preserved and sown, in order that the progeny may be subjected to the same scrutiny. Out of a hundred descendants of the original variant there may perhaps be only two or three showing the valuable characters of the parent. These are preserved, and the rest destroyed, because no better than the original type. By this means, in the course of a few generations, a new strain is obtained, showing some peculiarity—size, colour, form, hardiness, early maturity, and so on—rendering it a decided advantage to the cultivator. This, at least in the matter of seeds, is the history of all the celebrated specialties we hear so much of from the dealers. They are variants produced by the plant to meet a variation in its environment or conditions of growth.

This being so, the conclusion ought to come home to the cultivator that, if he wishes to maintain an excellent variety, true to its artificially produced character, and prevent it from throwing back in a few generations to the older original type, he must give it the conditions of culture which have caused the variation, or such modification of treatment as shall be equivalent thereto. In point of fact, this plain piece of common sense is rarely realized. The pedigree wheat is purchased, is sown under precisely the same conditions as was the poor sort it has replaced, and for a short time all goes well. But, sooner or later, the plant throws back to the old form, simply

because it is being subjected to the old conditions from which it had escaped. Hence it is that "pure-bred wheat only lasts a few years," and Golden Ball and Danzig have gone, and have followed the famous Blue Potato to the world of nothingness.

I am fully aware of the difficulty of introducing any modification in ordinary farm practice, where operations have to be performed on the large scale and by the instrumentality of rude and unintelligent labour. In the smaller operations of gardening there is very little difficulty in keeping cultures true for many years. And the reason is to be found in the watchful intelligence of the grower, and the power he has of altering the conditions of growth. But, even if it be practically impossible on the large scale of the farm, where acres replace the few square yards of the garden, to deal fairly by high-class wheats and give them what they require to keep from throwing back, there does not seem to be any valid reason why a half acre or so should not receive special treatment, and be set aside for growing the seed-wheat for the next crop. Obviously this would be a rational method of staving off the gradual deterioration which comes to the best seed when submitted generation after generation to coarse culture of a sort different from that under which it originated.

If there is any overmastering reason why choice strains of seed cannot thus be kept up to their original type for a longer period than rules at present, I should much like to hear it. We shall, perhaps, be told that this and that sort has lived its life, is worn out, and is dying of old age. But such talk is merely figurative, and drawn from a false analogy. Much of our popular phrasing is figurative, and we receive it, making a mental discount to bring it up to the naked truth. There is no analogy between the worn-out strain of Golden Ball and the failing energies of the farmer who grows it and sees it worsening year by year. Yet, watching its dropping behind, he carries over to its case a sad appreciation of what threescore years have done to himself, and puts the failure down to the same cause. It is worn out with old age. True for the farmer, who has but one vital spring—summer and autumn. But the wheat, accident apart, is immortal; it has many, possibly unlimited seasons. The protoplasm in this year's plant lies dormant but not dead in the seed-embryo, and wakes to a new spell of active life in next year's plant. It is the same protoplasm, however, not something created afresh, and there is no reason in the nature of things why that seasonal reappearance should not continue indefinitely.

The improvement or alteration in the interest of the cultivator may arise in several distinct ways. The most direct and simple is what is termed "Bud-variation." All the buds upon a growing plant are leaf-buds or flower-buds, and these two series as a rule keep true to their several peculiarities. But now and then one of a different type makes its appearance. The shoot thence arising is different from all others upon the tree, and it may even produce flowers and fruits which might be taken for those of another species. The peach is a good instance of this phenomenon. At rare intervals,

what is termed a "bud-sport" makes its appearance, and there results a shoot from which proceeds the fruit-variety known as the "nectarine," popularly taken to be the product of a different species. Such bud-sports have been known to appear upon the plum, producing purple instead of golden fruit, and *vice versâ*. The potatoe sometimes, though rarely, varies in this way; a white-skinned variety giving a stray red tuber, or conversely.

It would seem that this peculiar mode of variation is confined to perennials, and generally to species which have been under cultivation from early times. The vast number of ornamental trees, such as the variegated holly, euonymus and aucuba, the pendent and drooping forms of ash and willow, have originated thus, and year by year, bud-sports of pelargoniums, roses and chrysanthemums appear, and have their little day of popularity.

Variation of seedlings is the most commonly observed instance of this phenomenon. Owing to the inherent power of adaptation to their environment, no two seedlings, even from the same capsule, are exactly alike. The differences are mostly very slight, and in case of wild plants are apt to escape notice. However, among sowings made under the artificial conditions of a garden, such seminal sports are frequent, and give rise to the ever succeeding novelties of ornamental plants destined to border cultivation. Good examples of such seed sports are furnished by the common phlox and verbenæ. Our practical interest in these showy things is less than in useful variations of fruit-trees, and in a newly settled country especially there is abundant and grievous proof of the chancy character of the results. It is so much easier to put a few orange or pear pips into the ground than to procure and plant a grafted tree of known and approved sort, that we are apt to shut our eyes to the fact that the progeny will certainly not be the same as the parent, and will probably be inferior. Hence follows the lamentable show of poor seedling fruit which used to block our markets. Doubtless it is hard to make up one's mind to chop down a young tree which we have raised from the pip, and on which much care has been bestowed, even if its fruit proves third or fourth rate. But that way lies success. The masters of the art grow seedlings by thousands, and think themselves well repaid if one per cent turns out worth selection and preservation. So thought the gamekeeper who was supposed to have some secret for the breeding of first class pointers, and defined it by the dictum "*Breed a-many and hang a-many.*"

Almost all annual plants are liable to produce seminal sports. But for these variants to be of service to the cultivator, there must be an additional property, viz. *Heredity*. Annuals are propagated by seeds only, save in exceptional cases belonging to the higher horticulture. Hence the observant grower who has picked out a notable variant among his ordinary crops and saved its seed, knows that he has a further task before him, that is, as he phrases it, to "fix the variety." And this process depends for success upon the degree of assimilative power in the progeny. The seeds are sown, and all the

individual plantlets which fail to resemble the parent in that peculiar character for which it has been selected, are "rogued out" and destroyed. The few that have come true to the desired type are allowed to seed, and the selective ordeal is again enforced upon their offspring. After a greater or less number of generations thus treated, the tendency to reproduce the new type is practically naturalized as a property of this particular strain of the plant, and in current phrase, the variety is "fixed" and may be depended on to "come true." In practice, it is found that six or seven generations of the ordinary annual and biennial vegetable plants, peas, beans, cabbage, turnip &c. are sufficient to secure uniformity in the strain. Sometimes the desirable peculiarity is not hereditary; and then the variant cannot be fixed.

There is no necessity to apply this process of fixing the strain in the case of perennials. No doubt it would be as uniformly successful as in annuals, but the major part of a working life time would be required to bring to judgment and selection, say, five generations of an apple or a pear. Hence no attempt is made to fix a seminal heredity upon any perennial, there being abundant opportunity for multiplying the original variant unit by vegetative methods. Every shoot of the first individual claiming special notice and introduction to the general world of cultivators may, by grafting, be made into a new plant possessing all the characters of the original unit. Indeed one might contend that such grafted successor is not a new plant at all, but a part of the original under new conditions. Every rose-bud carries with it its own individuality when inserted on the plebeian briar. So do the multitude of raspberry canes, cut out from the one choice rootstock which bore them, and planted as cuttings. Even the wastrel strawberry runners of the prolific "British Queen" carry their patrician protoplasm along with them to the propagating bed, where they root and provide successors, other, yet the same, to those from whose side they were cut away.

The question arises—Can variation be incited artificially, or must the cultivator be content to raise multitudes of possible variants, and hold himself in readiness to spy out and pounce upon the one in a thousand which promises an advance upon his previous selections? The readiest method, and the only one which can be worked to predeterminate end, is *hybridisation*. Observation has shown us that plants vary, and that some of their fleeting characteristics are transmissible to their progeny in the ordinary course of pollination and seeding. In the wild state, the inevitable and indiscriminate averaging of the work of pollination, as carried out by insect visitants, keeps down the tendency to vary from the type. Still, hybrids do occur without man's intervention, and in some genera they are very numerous. For instance, hybrids of the European Willows and of the common Blackberry are counted by scores. The art of the observant cultivator comes in to give determinate purpose to all this chance-medley in which the busy bee is the chief operator. Given two variant seedlings, endowed with one valuable character apiece,

it is well worth while to isolate them from all others of the same species, and as it were, to *breed* from them in the two possible alternative ways. Let the stamens in A be carefully removed while the flowers are yet in early bud. The blossoms are then unisexual and practically female, possessing only an ovary and its receptive stigma. From B let the pollen be removed with a tiny hair-pencil and be applied to the stigma of A as soon as it appears to be mature. The precautions required to ensure a clear run to the experiment need not be detailed. The result is a ripe capsule full of seeds to whose constitution there have contributed two parents, each with a separate and desirable peculiarity. Conversely, A may be made to furnish pollen to an isolated stigma and ovary of B, with the result of a second series of seeds potentially endowed with the peculiarities of both parents. The experiment goes on to the germination of both sets of seeds and the close scrutiny of the resulting plantlets, to determine how far any of them have conjoined the parental characters. As before, the trials proceed through several generations, selection being kept up throughout. It is not advisable to rogue out the undesirable individuals too hastily. Often the whole of the progeny will be wonderfully alike, and the desired differentiation will only appear in the second generation raised from them. New characteristics, not observable in either of the originals, may present themselves, and it is fair to conclude that these are the result of *atavism* or recurrence to the type of a remote ancestor of A or B. It is, in plant-life a parallel case to the very possible resemblance of a child to his grandfather on one or other side, while showing little likeness to the features of his immediate parents. But how comes it to pass that the protoplasm or physical basis of the life of the two plants can, when commingled, arrest one characteristic and accentuate another, combine several, and restore some which belonged to anterior generations, is the most impenetrable of secrets.

Such is a brief resumé of the leading principles involved in plant-breeding that is the production of specially valuable strains of seed to be sown in the vegetable garden, or single examples of improved fruit-trees to be multiplied by grafting and budding into countless thousands for distribution among the world's orchards. The frequent complaint of the grower is that the fine old sorts he knew in his youth are no more to be had, or if offered, prove to be degenerate and unlike their remembered type. Then we fall on theories of decrepitude and old age. But let us consider a moment. The Champion potato tuber or the *Ne Plus Ultra* wheat is the result obtained by the watchful breeding together of the very best, with perpetual and pitiless weeding out of every descendant wandering away from the desired perfection. At length it is offered to cultivators for a price. Do they, or can they, with equal skill and certainty, rogue out the small percentage of wasters that come up in spite of their high lineage? By no means. These atavistic by-blows get just as much sun and air and soil-food as do the finest

plants in the field. They blossom, and in due time add their low-class pollen to the common average fertilization of the embryos, and, in their proportion, lower the grand type of the whole crop that is to come. Next year there are more of them. No skilled grower has detected them, and whipped them out before they matured for mischief, and so they do their pauperizing work again and on a wider scale. Thus the averaging down goes on, and the much patronized *Ne Plus Ultra* at last becomes difficult of sale. Farmers shake their heads over it and say it is not what it was ten years ago; it is running out and is worsening through old age.

It is worsening purely by the cultivators being unable, on their large scale of production, to carry out the minute inspection and jealous care it received when grown on a smaller scale in the trial-grounds of the professional seed-breeder. The reverted wasters will come, one here, one there. At the seed-farm, with its wide-apart drill lines, the watchful tender has them out in a trice before they gain the power to depreciate the common average of perfection. Who [in practical corn growing or in other wholesale cropping is sufficient for these things? As they are, simply, it is not to be done. And impracticable counsels of perfection are very apt to rile those to whom they are addressed. Who can wonder? However, it is something to know where the weak point of our practice lies. Reflection will lead us to expect a slow deterioration as inevitable from cultures on the large scale, and to meet it by rigidly careful selection of the very finest of our grain for seed, and a change of the old sort for the best recent results of the seed-breeder's labours, as soon as the worsening begins to affect the yield per acre and the weight per bushel.

S. E. D. MISAY.

Degeneration of Cultivated Annual and Biennial Seed-Plants.

The following paragraphs by Prof. John Percival, of the South Eastern Agricultural College have a direct bearing upon the question of degeneration of cultivated varieties of plants, that is, of the annual and biennial sorts, and may be compared with our several correspondents' views.

"A new variety of a plant propagated by seed becomes gradually established and, as it is termed, 'fixed,' by destroying all those individuals of each generation which do not resemble the varietal type. Fixation is, however, only a relative term, for even in cultivated varieties in which the process of destruction has been systematically carried out, and which have come true from seed for many generations, false plants or *rogues*, departing considerably from the type appear among the offspring at irregular intervals. For example, among plants raised from seeds of the best large-flowered cultivated types of pansy, individuals resembling the little

wild pansy (*Viola tricolor L.*) in form, colour and size of flower and leaves occasionally make their appearance. Also among crops of green-topped turnips, purple-topped individuals sometimes occur. Rogues most frequently exhibit characters possessed by the ancestors of the variety in which they are found. This tendency of plants to revert to long-lost characters is termed *atavism*, or *throwing back*, or *reversion*.

"Very few, if any varieties of plants propagated by seeds remain precisely like the type first sent out by the raiser for more than a limited number of years. In a great many instances, where almost everybody raises his own seed, the destruction of the rogues is not efficiently carried out, and through the consequent mixing with the progeny of these reverted plants, the type rapidly degenerates.

"Apart from incompetence to distinguish slightly reverted forms, and laziness in carrying out their destruction, other changes take place in the type through the different ideal which each raiser of seed sets up before his mind when he selects the individuals to be employed as seed-parents. For instance, three different raisers of Gubbins' Incomparable Pea are almost certain to hold different opinions from Gubbins and from each other as to the relative importance of the various characters of a good pea. Their selection is therefore carried out from three different standpoints, and in a few generations the "Incomparable" no longer exists except in name, unless the originator himself also carries on the propagation. Three different types bearing the same name must necessarily arise. It is therefore very necessary for the farmer and gardener not to be led away by the fascination of an old name, for it does not follow necessarily that any thing useful is obtained with it. At the same time, it must be remarked that a new name does not necessarily represent any new character or quality in the seeds to which it is applied. New names may easily be applied to old articles when the latter cannot be sold under their original names.

"Much valuable experience may be gained by growing small trial plots of several differently named varieties of farm and garden plants of the same species. Also a very useful lesson will be learnt by sowing in small plots samples of seeds of, say, turnip or pea or other plant, bearing the *same* name and obtained from half-a-dozen *different* firms of seedsmen. Farmers rarely do enough testing of this kind."

THE CAPE WOOL TRADE

AND AUSTRALIAN METHODS.

Considerable space has been devoted, in recent issues of the *Agricultural Journal*, to various phases of the wool industry in this Colony as they compare with the methods in vogue among the great producers of the sister Colonies in Australia, and to make the comparisons clearer we again return to the subject in this issue. The wool industry is of too great importance to this Colony for it to be treated lightly or in any other spirit than that of our great staple product. Mining, and all that follows in its train, is undoubtedly of vast importance at present, but the day must come when the enormous wealth of our mineral deposits will be visibly reduced, and the energies of the major portion of the population be turned, by the force of circumstances, more towards the cultivation of the soil, and when that phase of our history is reached, wool—judging by present indications—must be king. It is therefore imperative that no opportunity should be overlooked of improving the methods now prevalent in the working of this industry. This feeling is growing throughout the country, we are pleased to note, and with the object of encouraging those who are anxious to help forward the movement in the direction of progress, we now offer some further information as to the methods of our competitors, along with the views of merchants and buyers in London and Bradford, which we trust may prove of some benefit. In the November issue of the *Agricultural Journal* some details were given as to the methods of wool-classing in Australia, which showed some of the means by which the growers there make, and maintain, their market. In this issue we are enabled to show by means of illustrations the working of a sheep station at shearing time. The photographs which are reproduced were kindly lent by the Hon. John Frost, Minister for Agriculture, who secured them while on a trip to Australia, and though they do not represent the most up-to-date methods are sufficiently modern to convey to our readers a fair sense of the magnitude, to which the wool industry has grown in Australia, and the perfect organisation under which it is conducted. All the photographs are taken on the Burrawong Station, a well-known estate in New South Wales.

THE SHEARING SHED.

The first view shows the interior of the shearing shed in the height of the shearing season. The first innovation that strikes the eye is the equipment of machine shearing gear, driven by power outside the building, and the next, the air of busy industry that pervades

the scene, and lastly a close inspection will show the "board," as the floor is called in Australia, to be scrupulously clean. Judging by appearances, this photograph probably represents one of the earlier installations of the shearing machine, as the shed looks like one which had been used for hand shearing. But the value of this photograph, to people at a distance who have no personal knowledge of machine shearing, is that it shows the different positions of the shearers while at work, and the care that is taken not to tear or break the fleece as it comes off the animal. The space usually allotted to each shearer seldom exceeds four feet, and as the sheep is sheared the fleece is kept entirely clear of the animal. On close inspection the whole operation of shearing will be traced. One shearer is working on the belly, another is opening up the neck, another is taking on the side, and another going up the back, and so forth. This shows how the shearers hold the sheep for each of the various positions in shearing.

As the fleece comes off, it is gathered from the neck and shoulders to the breach, and thrown on to the table, where it is skirted *i.e.*, the seedy and ragged edges taken off. After each animal is shorn, a boy sweeps the "board" (the floor), and the smaller pieces and second cuts are placed in the basket shown in the middle. The same boy stands by with the Stockholm tar, to touch any spots on the animal's skin which may be nipped by the shears. In the foreground the fleece is shown on the floor ready gathered to be thrown on the wool table.

It is mentioned above that this photograph is probably taken of a shearing shed that was originally constructed for hand-shearing, and we may now explain that in a modern shearing shed there is not nearly so much wood work. They are built high, and clear of all obstructions, with as much light and air as can be obtained. The floor of the shearing shed is constructed from three to five feet above the ground. The sheep are brought down the centre of the building in a railed off space, each shearer having a pen of his own to draw upon. This part of the shed is floored with battens an inch apart, to allow of the droppings of the animals falling through, and thus prevent the contamination of the wool as much as possible. From the pens outside, the sheep are driven up an incline to the shed, and when the shearer has finished with the animal it is released through a swing door at the back of each man, and down another incline to the pen, so that an accurate tally is kept of the number of sheep passing through each shearer's hands. It must be remembered that the Australian shearer works on piece—£1 per hundred is the usual wage—and they get through 150, to 170 and even 180 per day of eight hours so there is no time to lose.

THE WOOL-ROOM.

This is an excellent view of a wool-room with the wool-rollers and piece-pickers at work. In the shadow, on the right, the bins for the classed fleeces may be seen, while on the upper staging can be seen the fleeces sorted out in the order generally adopted—all the

coloured or black fleeces being kept quite apart from the white wool. The wool-rollers are shown in the foreground, rolling and skirting the fleece, and right at the back may be seen the basket, with the pieces as it comes from the shearing shed. The experienced wool-man will at once notice that all the fleeces on the tables, with the exception of one, are shown skin-side up. This we may presume to be at the suggestion of the photographer who was probably anxious to introduce the white to gain an artistic effect. Of course the fleeces are always skirted with the skin-side down. In the foreground, on the right, a fleece is shown rolled ready for the classer, who is working at a table right at the back, and cannot be very clearly distinguished. It will be noticed that the tables shown here are made of inch flat battens, placed an inch apart, so that dirt, second cuts and locks from the fleece may fall through. In the more modern tables rollers set from side to side instead of from end to end of the table take the place of these battens and they are found to be superior in every way. Another feature of this wool-room is the excellent light thrown on the tables, and the cleanliness of the floors and tables. The most scrupulous care is taken to secure cleanliness, and prevent any dirt or foreign matter getting into the finished product, and it has been found in practice that this care pays very well in the end. The wool-room is not as a rule raised above the ground level like the shearing shed.

THE BALING PRESSES.

The view showing the baling press speaks for itself. The fleeces are usually packed in the bale in alternate tiers of four across each other, so that when the buyers open the bales they know exactly how the fleeces are packed and can sample a clip without damaging or breaking a single fleece. When buyers get used to this regular packing it gives them confidence, and they will give better prices. Not only that, but they will look for the same brand in the future. The fleeces are brought to the baler by hand, and each box as shown in the picture is filled separately. The top box when filled is run over the lower one, which has also been filled by hand, and the contents of the two are then mechanically pressed down into the bale which may be seen in the lower box, the packed bale ready for market being shown tilted over in the foreground.

A SHEARER AT WORK.

The photograph showing the shearer at work is excellent, as it gives more detail than the general view of the shearing shed. The fleece is shown half off, and lying perfectly clear of the animal while the shearer is running the shears straight up the back. From the attitude of the operator, and the general effect conveyed by the photo, it is probable that he is one of the smart hands capable of getting off as many as 150 to 180 fleeces in a day of eight hours. Sheep men will notice the unbroken manner in which the fleece is laid over on being shorn, and how exactly the machine shear does its work by the

fact that even in the photograph one can almost see the "pinking" of the skin. This photo also shows clearly how few are the second cuts and fribs made by the machine compared to hand-shearing. Behind the shearer can be seen some of the detail of the machine shearing gear which is now in general use throughout Australia, while the scrupulous cleanliness of the work can be gathered from the clear outlining of the boards.

OUTSIDE VIEW OF THE SHEDS

The view of the outside of the shearing shed shews the method of handling the wool after it is baled. The rails in the foreground run from a loading stage, where the wagons come to take the bales off for despatch to the nearest railway station, right into the wool shed where the wool is baled and packed after passing through the hands of the classers and pickers. A truck with a bale on it is shewn in the distance. Close inspection will show the pens mentioned previously from which the sheep are drawn for the shearers, and those into which the shorn sheep are placed after leaving the shed. The view also shows very clearly the height of the shearing floors from the groundlevel, the windows giving light to the shed, and the apertures with swing doors through which the shorn sheep are expelled.

The Buyers' Standpoint.

London and Bradford Views.

On South African Wools.

BY DR. E. A. NOBBS, PH.D., B.Sc., F.H.A.S.

During a recent visit to England I took occasion to visit several of the leading firms interested in the wool trade in London and Bradford, and the following is an attempt to put on record the views that were then expressed. There are two sides to every question, but it is only intended here to give that of the merchants, brokers and manufacturers—every farmer in the Colony can fill in the other side to his own satisfaction.

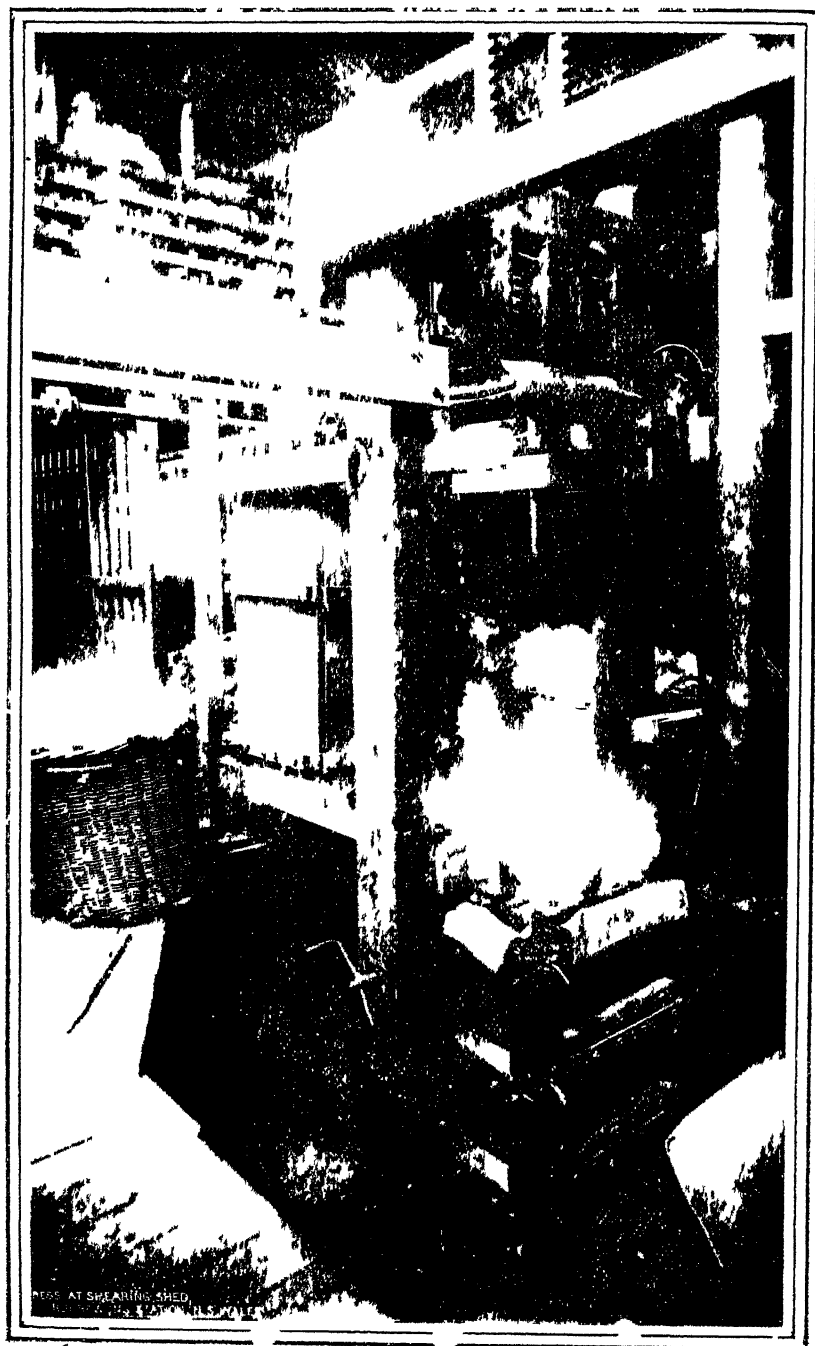
When discussing the question of wools, the first point to be borne in mind, is that the world's supply of really high class merino wool is very limited, and that no country possesses more natural advantages for its production than South Africa. For fine merino wool there is an unlimited demand at the current moderate prices, which if not as high as they once were, still leave the farmer a fair margin of profit. This demand is so great that it is never satisfied. At the same time any serious rise in price would compel manufacturers to resort to substitutes, to the permanent detriment of the merino industry. It is

a general belief, however, that the barn-door price can to-day be raised, if the wool were only better prepared for market, and this the farmer might do by a little handling of each fleece, before it enters the bale, at a much less cost than is afterwards required to attain the same end.

The extra cost to the farmer would be trifling and the profit considerable. At the same time this profit would not be immediate, as it would take some little time for the English buyers to become fully alive to, and convinced of, the changed conditions, also, it is too much to expect that such a change could take place all over Cape Colony at once; still any signs of improvement would probably meet with fair encouragement. Some manufacturers state that an improvement has taken place in Cape wools during the last twenty years, but that seems a long time to have to look back to in order to see signs of a change; others, more cautious perhaps, will only admit that our wool is "not deteriorating" which is but scanty praise. A special warning against a tendency to coarseness was given, but the prevalent and most serious fault is want of length. It cannot be too strongly impressed on Cape farmers that the reason for the frequent low prices of good wool is simply due to its shortness, whereas good prices will be readily paid for a twelve months' growth. This want of length is a chief cause why Cape wools often fetch much lower prices than Australian merino wools, which are otherwise not a bit better, if so good. The market is always overburdened with short wool. The irregularity of length, and the doubt as to whether each bale has been sorted and classified, along with the fact that a consignment is apt to consist of a heterogeneous collection from many different farms, the wools of which differ widely in character, gives an element of uncertainty, and a feeling of insecurity, which prevent the purchaser giving the price he would be quite willing to pay, if he were sure that the lot he was buying were uniform throughout, and the same as the sampled handful he drew from the bale. Where he can be sure that he is buying exactly what he wants, a manufacturer will always be willing to pay a high price, even for something that is not the very best, if it happens to be the quality particularly suited to his requirements; a mixed bale, even where the admixture is actually a higher grade of wool, is worth less to him than one of the lower grade, if only it is of one quality throughout. And of this they say they are never sure with Cape wools. It is a great drawback, and one which may take a long time to get over, but it is by no means insuperable if only the wool growers would take the matter seriously. The remedy is in their own hands. In Australia things are said to be very different and what is customary there, should surely not be impracticable here. The buyers of Australian wools have learnt to look for each class of wool, under a distinct name, and the resulting feeling of security increases their readiness to purchase, and adds materially to the price. In this connection reference was repeatedly made to the benefits resulting from the instruction given at the Technical School,



Pens and Shearing Shed (outside), Burrawong, N.S.W.



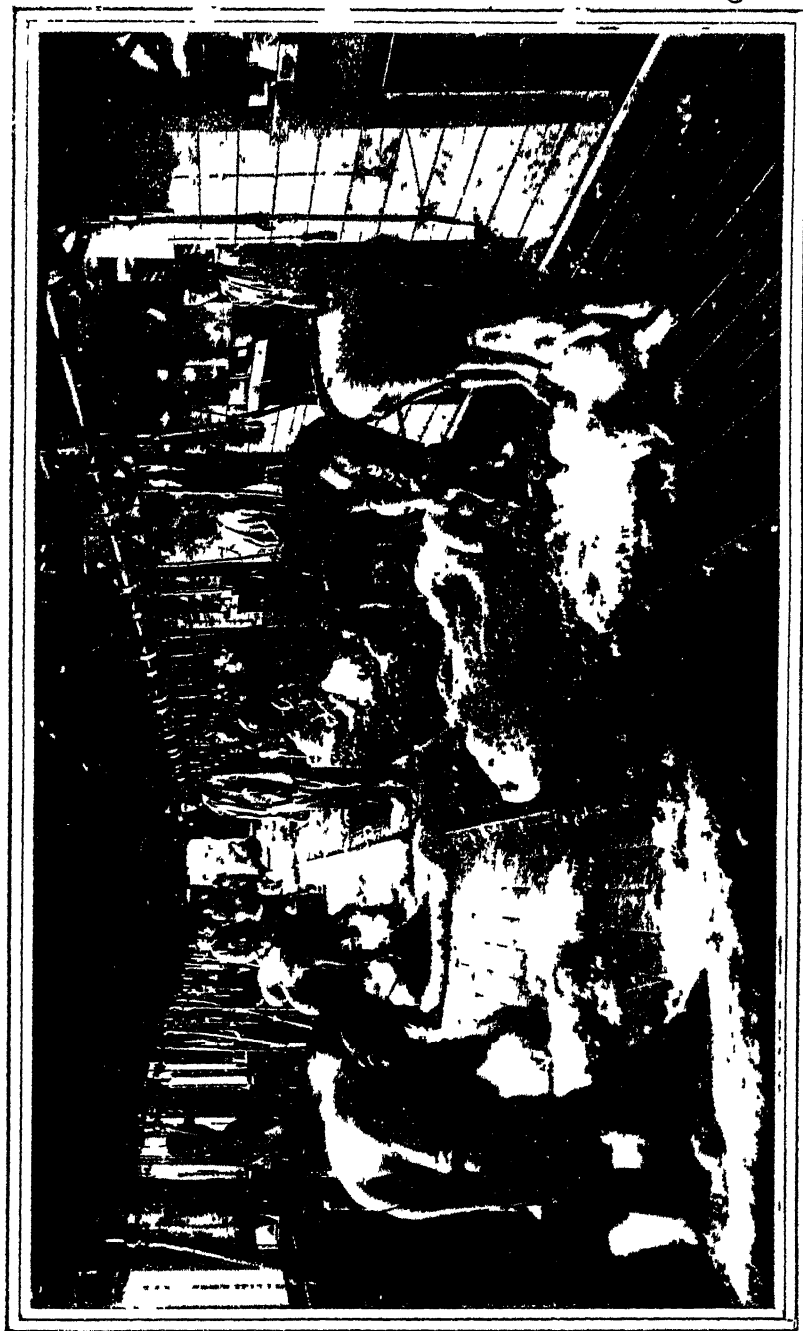
Baling Press, Burravong, N.S.W



Shearer at work with Machine.



The Wool-Room, Burrawong, N.S.W.
Showing Classers, Rollers and Piece Pickers at work.



Interior of Shearing Shed, Burrawong, N.S.W.

Adelaide, in wool sorting, where this beneficent doctrine of uniformity was inculcated, and it was suggested that by similar means, we in this country might overcome the irregularity and unevenness which militate, so seriously, against the value of our wool.

Besides direct instruction much good might be done at the various agricultural shows throughout the Colony, by demonstrating what is really wanted and how comparatively easy it is to provide it.

The Cape farmer was not advised to go in for cross-breds because these would give him a wool that was in direct competition with that of all the large wool producing countries, while he would sacrifice all the natural advantages which this country possesses over all others for merinoes. Further such cross-bred Cape wool as had reached the English market gave no prospect of any such advantage over others. This view was of course expressed merely on the *wool* side of the question, and quite apart from any reference to meat production. From the farmers standpoint, the question is whether the enhanced price for meat will more than counterbalance the diminished returns for wool. The English buyer concerns himself only with grease wools the scoured commodity goes to Scotland and Germany.

Touching the matter of breeding, our farmers are earnestly advised to make the most of the one point in which they already excel and to develop to the utmost the characteristic fineness of their wool by extreme care in selecting breeding stock and in keeping it pure.

As to shearing, as far as the buyer is concerned his one demand is for a full years' growth, and his belief is that it ought certainly to be the more profitable course.

With reference to sorting, the opinion was expressed that while it was essential in moderation there was at the same time no occasion to make it a very elaborate or difficult task. All that was demanded was that each fleece after being removed from the sheep should be laid on a table, and that the matted edge and hardened dags should be removed, while reasonable care be taken that no straw, sticks stones, or other rubbish gets into the wool bales. This is an old trouble against which laws were enacted as far back as the days of Henry VIII, but it still continues. If this skirting were properly carried out and bales marked "skirted" could be relied upon as being really so, the price would probably rise a farthing a pound, while bales marked as containing skirtings, bellies, broken fleeces, pulled wool, etc., would fetch comparatively good prices there being always an active market for this class of produce. The mistake is sometimes made in Australia of dividing the wool into too many classes. This reduces the size of the lots just as it increases their numbers, and does not raise the price sufficiently to induce one to recommend the practice. It is a distinct advantage to make up big parcels, especially if their uniformity throughout can be relied on. Small lots are at present an undesirable characteristic of Cape wools. Of course the flocks are usually smaller than

Australian ones, but that is not a complete explanation. If a farmer takes the trouble of skirting his wool at all, he ought to do so thoroughly; an imperfectly skirted parcel is little better than an unskirted one. In the Australian clips at the London sales the skirtings frequently run at twenty and up to fifty per cent. of the whole, indeed a clip is looked on with suspicion if there is but little skirting with it. A few unskirted bales in a clip are apt to lower the price of the whole. In Australia they have gone to the opposite extreme in some cases, and sorting has been carried too far. Only in the case of inferior wools—for which there is a constant demand at a moderate price—skirting is not necessary, and would not repay the labour.

Classification according to length is not difficult to accomplish and materially enhances the price.

Our common practise of branding was spoken of as objectionable and damaging to the price.

Our methods of packing meet with approval, but it is a curious fact worth noting that the bales from Australia, when on view in the great warehouses by the docks at London, look square and tidy, whereas those from South Africa have a misshapen bashed appearance which while not of vital importance is said to detract somewhat from the price. Need this be? It is worth while to give bales a good external appearance, it gives an impression of care, and attention to detail which augurs well for the contents.

The secret of transport seems to be to keep the bales dry. It is inexpedient to dump wool that is particularly rich in grease. The complaint of the buyers is not with the wool itself, that is all right, but it ought to be in a more saleable condition. The general get up is unsatisfactory, its appearance is against it, the confidence of the buyers is shaken, the prices fall. As one leading broker briefly summarised it: "Keep your dirt."

It was repeatedly remarked that the buyers' representatives in the Colony have a serious grievance as regards facilities for examining the wool at the ports. It was stated that the buildings where the wool is on view are quite unsuited to their purpose, being dark and uncomfortable, very different from the commodious and convenient warehouses in London and Bradford where one can readily examine either end of all the hundreds of bales exposed to view, previous to the sales.

As regards the vexed question of freights, opinions seemed divided, some affirming that if these were reduced, the keen competition would maintain the present prices in England, so that the farmer would reap all the benefit, whereas others thought that the charges being regulated by a powerful "ring" all buyers were equally affected, so there was no ground for complaint.

Scab which exercises the Cape farmer so greatly, seriously reducing his total output, does not affect the buyers, though it tends to make the wool fragile; the disease is hard to detect, and the loss is chiefly in quantity, so is borne by the farmer alone.

Of the numerous factors which combine to make wool good or bad there is only one which is beyond the farmer's control, for which he can do nothing, and that is the suitability or otherwise of his land. What is not suited to sheep-farming cannot be made good. At the same time it is surprising how much, by care and thought, the poorest land can be improved; even at that however, bare rock, absence of water, evils of situation, and climate often form insuperable difficulties. Some of the other factors of wool growing have been referred to above, as seen from the merchant's, the broker's and the manufacturer's standpoint whose interests when all is said and done are the same as the farmer's viz, to obtain as good a wool as possible. It was with this object that some representative men amongst them were good enough to favour me with the views above expressed, and my thanks are specially due in this connection to Mr. Frank B. Windeler, Secretary to the Associated London Selling Wool Brokers, and to Mr. Charles Balme of London, and to Messrs Addie, Crabtree, R. and F. Moore and J. W. Turner of Bradford for valuable hints and unbiassed criticism. The constant burden of their message to South African Wool growers may be summed up as: "Price depends primarily upon quality but is greatly influenced by uniformity, and care in preparing it for market."

CAPE MOHAIR.

Mohair has earned its place as one of our staple products, and England looks naturally to the Cape for its supplies of this valuable article. The reputation of being the first country in the world for mohair is something well worth fighting for, and one which can be maintained by constant effort and enterprise alone. Our methods of breeding, the critics at home tell us, are on the right lines but they add that there is still plenty of scope for improvement. This bettering of the quality of mohair is what is wanted by the brokers and manufacturers, for which they are willing to pay high prices. It is to be attained, they think, by the exercise of more care in grading the flocks than has in the past been shewn, and by paying the utmost attention to the improvement of the blood. To attain this this end no sacrifice is to be considered too great; no one in England has the slightest hesitation in affirming that it is the finer qualities of mohair that really pay best.

For these there is a perennial and unlimited demand never yet satisfied. At present the bulk of our mohair is too strong, coarse and short. The coarse heavy oily goat produces strong low class mohair and the increased quantity does not make up for the lower price by a very long way. The manufacturers point to the very high prices given for "kids" as conclusive proof that they want and will pay heavily for fine mohair, it readily realises three times the price of the coarse. Fine mohair again seems to be something for which the Cape has a natural predisposition, for no other country in the world has better climatic and other advantages for its production.

Why does the colony not take fuller advantage of these commercial fields in which it stands unrivalled?

Another point that is second only in importance to the fineness of the mohair is evenness of length. At present any and all lengths are frequently found in the bales. What the manufacturer requires is hair as nearly as possible seven inches long, both longer and shorter are worth less to them. This is a matter which only needs to be known to be acted upon. In the same connection warning was given that the present demand which exists for quite short mohair is not likely long to continue. It is due to a passing fashion in certain materials for ladies dresses and must therefore not be depended upon.

Of course the whole value of mohair over wool lies in the lustre, to preserve and increase which ought to be the chief end of the grower. Lustre is liable to suffer if water gets into the bales. Too much care cannot be given therefore to keeping them dry.

The same complaint that was made of lack of proper accommodation for examining wool at Port Elizabeth, was made also in the case of mohair. Better prices would be given all round if buyers knew what they were getting. It is the uncertainty that lowers the price. The removal of this element of risk would certainly redound to the advantage of the farmers.

Casually the farmers were particularly warned against the use of sticky dips which cause the dust to cling to the mohair, seriously injuring the lustre, hence lowering the price.

American mohair has not as yet affected the English market. The samples which have been seen in Bradford were not such as to tempt the buyers away from the Cape trade. As to the £100 export duty the merchants think it an obvious case of the lock put on the door after the horse is stolen, and that its only effect will be to prevent a remunerative trade in high-class stud animals taking place with the United States—a branch of agriculture which of all others is the most paying in England at the present time.

Such are a few of the ideas of the London and Bradford brokers and merchants with regard to our wool and mohair. Surely it is good business to try and supply the Colony's best customers with what they most want and what they cannot get elsewhere. It should pay.

BLUE GUMS AS FOREST TREES.

The Outeniqua Plantations.

Interesting Report.

By C. H. McNAUGHTON, Conservator of Forests, Midland
Conservancy.

THE BLUE GUM-TREE (*Eucalyptus globulus*) TO THE SOUTH OF THE
OUTENIQUA, MIDLAND CONSERVANCY. C.C.

The success attending the introduction of an exotic species into any particular locality can only be estimated by a comparison with the growth of the species under its natural or indigenous conditions, or with that determined for other localities by such comparison. Success is but relative, so in dealing with the introduction of the Blue Gum tree or *Eucalyptus globulus* into the locality south of the Outeniqua range of mountains in the Midland Conservancy it is first necessary to indicate under what factors of locality, or in other words under what conditions of soil and climate, the species has been tried, and to compare these with those of its native clime, or with those of a locality where it has proved successful from a forest point of view. I propose therefore to prelude my report with a brief assessment of the factors of the locality of the country under review, so that in considering the figures and facts given later, such modifying influences as may exist may not be overlooked. This assessment, for present purposes falls naturally under two heads—climate and soil.

CLIMATE.

The climate of a country depends on its situation, and by it is understood the different local peculiarities of the atmosphere to which it is subject. To a forester, broadly speaking, the climate of a locality demands far greater attention than the soil, for it has a greater influence on the life and growth of plants than has the degree of fertility of the soil. This fact is too often overlooked in this country. The physical or local climate of a locality depends on its geographical position, its elevation above sea level, aspect, gradient, shape of surface and surroundings, each of which affects plant life. The locality at present under consideration is a strip of land lying about the 34° S. Lat. and between the 21° and 24° E. Long., bounded on the south by the Indian Ocean and on the north by the Outeniqua

Range of Mountains, known locally as the Outeniqua, Zitzikamma and Karedouw Mountains as the range extends from west to east. This range rises comparatively abruptly from a series of foot hills to a maximum height of some 5,500 ft above sea level (Point Krakeel or Formosa), and extends approximately from east to west, roughly parallel to the coast line, leaving a belt of land varying in width from 5 to 21 miles between it and the sea. This belt itself rises suddenly from the sea, leaving a rugged and precipitous coast, broken here and there by low lying open river mouths and estuaries, such as the Brak River, Zwart River, Knysna River, Keurbooms River and Groot River Mouths. These openings are in instances flanked by rolling sand dunes, from which sand is driven inland by heavy winds, causing an appreciable effect on the physical condition of the soil in their immediate neighbourhood. The mean altitude of the greater portion of this belt would be about 700 ft though the foothills to the north rise to some 1500—1600 ft. The general character of the surface is undulating broken by many deep river beds, running usually due south, and interspersed with occasional fairly extensive flats. To what degree the country is broken may be estimated from the fact that from Brak River on the west to Storms River on the east, a distance of roughly some 150 miles by road, fourteen main passes have to be negotiated descending and ascending several hundreds of feet, from the main level through the river beds, by all cart and waggon transport. Some eighteen fairly large rivers have to be passed within the same distance.

THE MAIN ASPECTS OF THE BELT

are S., S.E., and S.W., the cool aspects of this hemisphere, which are in addition modified by the prevalent S.E., and S.W., winds, cool currents sweeping in from over the ocean. As regards moisture, the belt of country is placed by Mr. Alex. Buchan in his "Observations on the rainfall of South Africa 1885-1894," partly within the 30-40 inches maximum annual rainfall zone, and partly within that recording 40 inches and over. This rainfall is fairly evenly distributed and may be regarded as a favourable and copious one. From the observations of eight stations, situated within the belt, carried out for a number of years, it is found that the mean annual rainfall is some 36.58 inches, with the highest mean record at Buffels Nek (2,200ft) of 48.50 inches, and the lowest at Knysna (30ft) of 28.09 inches. Taking the whole of the observations for the eight stations it is found that the rainfall is fairly evenly distributed throughout the year, though the summer months with a mean of 3.44 inches per month claim the larger proportion, the winter months recording the average of 2.28 inches. The mean monthly maximum is claimed by September with 3.99 inches, and the mean monthly minimum by July with 2.12 inches. Unfortunately only two barometric stations exist in the area. Concordia Plantation (Lat. 34° 2min. S, Long. 23° 3min. E.) situated about the centre of the belt and 950 feet above Sea Level

being one, and Storms River Forest Station (Lat. $33^{\circ} 58'S.$, Long. $23^{\circ} 53'min. E.$) situated to the east of the belt and 580 Feet above Sea Level being the other. The observations at these two stations show an average mean annual Relative Humidity of 81.8 and 75.15 respectively, with the higher figures in mid summer and autumn, and the lower in the middle and end of winter. This obverse of what is usually to be expected is due to the rainfall distribution, the prevalence of cool moist winds in the summer months, and hot dry "berg" winds during winter. This fact is of some importance, as apart from temperature, the degree of evaporation from plants depends on the degree of saturation of the atmosphere, relatively dry air causing rapid evaporation which gradually ceases as the air becomes saturated, and the degree of evaporation in its turn gives the rapidity with which water, containing the various plant foods, is taken up by the root systems of plants. Again as radiation is slower in a moist than in a dry atmosphere the dangers of frost are minimized in the former instance. A feature which must not be forgotten here is the fact that within the belt of country under discussion, some 100,000 acres of native indigenous forest occur, which naturally has an appreciable effect on the general climatic conditions.

HEAT PLAYS AN IMPORTANT PART

In the factors which govern plant life. It is not necessary to discuss here its actual bearings. It may be sufficient for present purposes to draw attention merely to the undoubted fact that mean temperatures are of much less importance than the extremes experienced, and this more especially so in the growing season. From an examination of the records of the two meteorological stations before referred to, for a period 1892-1899 inclusive, it is found that for the former station—Concordia—the mean maximum temperature is 67.8° , and the mean minimum 53.3° ; the absolute maximum 85.8° and the absolute minimum 45.7° . The maximum temperature recorded during this period was 101° in February 1893 and September 1895, and the minimum temperature 37° in August 1893, July 1895 and September 1898. At Storms River the mean maximum temperature is given at 71.4° and the mean minimum 51.5° ; the absolute maximum 90.4° and the absolute minimum 51.8° . The highest temperature recorded was 104° in February 1893, January 1894 and February 1897, and the lowest temperatures in September 1895 when the thermometer registered only 31° . These two stations may be taken as fairly typical positions and the records as characteristic of the climatic conditions. Generally the climate may be regarded as fairly equable, with a humid summer, especially in the low lying localities, and a dryer winter due largely to the prevalence of hot dry winds. Sudden changes of temperature are most frequent in early spring when a variance of 70° has been recorded, while frosts are but infrequent.

THE PREVALENT WINDS.

Are South-East and South-West which, sweeping over the sea, are cool and moist. Much of their moisture is precipitated against the S.E. and S.W. slopes of the Outeniquas. It is a noticeable fact that by far the largest percentage of the native indigenous forest occurs on the S.E. and S.W. aspects, facing the two cool and rainbearing winds, and that often the ridge forming the break in the aspect is also the limit of the forest. Not infrequently these winds, especially in the summer and autumn, take the force of moderate gales, those from the S.W. being usually the heaviest. The balance of the rainfall is supplied by heavy north westerly winds, which are most frequent during the winter months. These winds not infrequently do a good deal of damage by causing windfalls in the native forests and in young plantations. During the winter and especially towards the end of this season the country is subject to the very unpleasant hot dry winds known locally as "berg winds." Usually commencing about 2 a.m. in the morning they continue for two or three days when they are not unusually followed by rain from the north west.

Their general direction is from the north or north-west and they are specially severe in the neighbourhood of a "Pass" or break in the mountain chain. George lying to the immediate south of the Montagu Pass is especially subject to these unpleasant phenomena.

The drying effect of these winds on the vegetation is remarkable, and extensive fires often follow in their wake. (They form the principal danger to winter planting of transplants.)

SOIL.

It has been said that climate is of more importance to plant life than is the nature of the soil, but this latter is of sufficient consequence as to demand the serious attention of the forester. Almost any soil can furnish a sufficient quantity of mineral substances for the production of a crop of trees, but the return will depend on the species of tree selected and its degree of suitability to the locality factors. Wood production is not directly proportionate to the chemical composition of soils. The same species may thrive equally well on soils of the most different geological origin, while great differences in quantity and quality may be found in timber grown on soils of the same geological character. It is the physical and not the chemical composition of a soil that is most important—depth, porosity, degree of contained moisture, &c. All species, nearly, prefer a warm, fresh, porous, deep and chemically strong soil, and one rich in humus, but they differ considerably in the degree of variance from this ideal in which they can thrive and be profitably grown. Roughly speaking broad leaved species require a higher degree of soil fertility than conifers do, though the latter vary in themselves very considerably in their soil requirements. Again some species can only be successfully grown in a certain class of soil, with a minimum percentage of lime (Calcium carbonate) while others fail totally in a

soil containing as little as 1 per cent of this mineral. (The Cluster Pine *P. maritima* presents a ready instance of this as does the Sweet Chestnut *Castanea vesca* in Europe). In introducing a species therefore it is necessary for the forester to study its soil requirements more especially its physical ones, and to note any particular characteristic in regard to any particular chemical constituent it may have. Woody plants take by far their greater portion of nourishment from the air, more especially carbon, but a certain part is derived from the soil. Qualitatively trees require the same substances as do field crops, but quantitatively they require far less. According to Ebermayer "Physiologische Chemie der Pflanzen" the average acre requirements—for wood alone—of Beech, Oak, Silver Fir, Spruce, Scotch Pine and Birch High Forest are only one-twelfth of the ordinary and one-twentieth of the rarer mineral substances of the average acre requirements of field crops. Rye, Wheat, Barley, Oats, Leguminous Crops, Colza, Clover, Potatoes, Beet, Meadow-hay, Tobacco and Wine. It follows that soils minerally unfit to produce a field crop may be quite fertile enough to guarantee a good crop of timber. In dealing with the soil of the belt of the country under discussion the subject divides itself into its geological, physical and chemical character. The substructure of the Outeniqua Mountains and this portion of country is of Archaean origin, passing into granites on the one hand and into micaceous and argillaceous schists on the other, with interstratified quartzites &c. Outcrops of granite are to be seen in the neighbourhood of Great Brak River and eastwards as far as the Hooge Kraal River. Superimposed lie primary or palaeozoic rocks, which have been elevated by a tangential thrust from the south, caused by a subsidence of portions of the Indian Ocean. Of these the highly inclined Outeniqua Mountains are composed. The rocks which principally compose this range are included in the Silurian Division of the Palaeozoic Group, a group which consist mainly of hardened mud, sand and gravel of the sea bottom, and contain the earliest record of plant and animal life. The principal rocks of the range are clay slates and Table Mountain Sandstone, and by the weathering of these the main mineral constituents of the soil are obtained. It has been said that in the western portion of the belt granite and granitic soil is met with, but their occurrence is so limited that for present purposes they may be ignored.

THE CLIMATIC AND PHYSICAL CONDITIONS

Of the locality naturally tend to produce what is known as an 'acid' or 'sour' soil of which the outward evidences, so familiar in our coast region where a good rainfall is experienced, are the coarse grasses, sedges, rushes and reeds in the veld, and the presence of Sorrel (*Rumex*) in the cultivated areas. These conditions may be summed up as follows—a humid climate, a fine grained cohesive soil, deficiency of lime or similar base, and abundant organic matter. For the proper production of plant life a favourable

condition of soil is important. This can only be gained by proper aeration, which is essential for the setting free of the mineral substances combined with the contained organic matter, in forms in which they can be assimilated by plant life, or in other words, for proper nitrification. A suitable or sufficient temperature, presence of lime and proper degree of moisture tend to assist this nitrification. Here the humid climate, heavy, evenly distributed rainfall, compact soil with its great water retaining power, prevent proper aeration of the large residues of decayed vegetable matter, and the marked absence of lime serves to heighten the evil caused thereby and in spite of a favourable temperature a strongly acid soil is formed. In this acid soil with its limited supply of oxygen only a small portion of the contained vegetable matter is decomposed into water, ammonia and carbonic acid, but with the decomposition appear organic compounds and acids (butyric, acetic &c.) which are injurious to many varieties of plants. The balance of this matter is formed into a substance known as 'acid humus' containing usually appreciable quantities of carbon, nitrogen and mineral matter, though the two latter in forms not assimilated by plants. With proper treatment, in which a main feature is thorough turning over and consequent aeration, this sour soil has been known to give excellent field crop returns and as will subsequently be shewn, good timber returns. It is possible to divide the soils of the belt into three main classes, distinguished mainly by their degree of acidity, a condition depending largely on their physical properties. In the first class may be placed the stiff compact clay and very fine sandy clay soils. These lie usually along the skirts of the mountain range over areas which have not borne forest, at least during anything like the near past. In the second class may be set the looser, lighter and sandier clays, forming a mean between classes one and three in character as they probably do in origin. In the third class are included certain patches and strips of land along the coast line which are almost 'sweet' in character and which have arrived at this condition by a more perfect aeration due to a larger admixture of coarse sand grains swept in by winds from the coast dunes, and the presence of more lime which tends to liberate phosphoric acid and potash, and by combining with the nitric acid on the soil to produce proper nitrification. Generally speaking the soil of the whole of the country is poor in character, lacking in the most important inorganic elements of plant food and while often rich in nitrogen, containing this substance in a form not easily assimilated by plants. The forest soils and burnt forest lands show great richness in this substance and organic matter generally, but the vlei or alluvial soils, especially those near the coast are undoubtedly of the best quality all round.

THE DEPTH OF THE SOIL

Naturally varies much, from a few inches to several feet and it is impossible to give any average. The subsoil is often a clay, from

stiff and compact to fairly loose and friable. Sand, more or less finely divided, appears in localities, as does the clay slates, sand stone and conglomerates. Patches of ironstone gravel, so common in acid soils are almost everywhere met with. Possibly it may be said that with the exception of but few localities, there is a sufficient depth of soil and a sufficiently accomodating subsoil to carry the majority of the timber crops which are suited otherwise to the climatic conditions which obtain.

The factors of the locality, and their general relation to growth of trees having been briefly discussed, and before turning to their influence on a particular species it is advisable to remark on this species under its native and other conditions. Of late years possibly more has been written on the Blue Gum tree of Victoria and Tasmania than on any other tree known, but as much of this is not generally available, a short recapitulation of some of the points of interest may not be superfluous.

THE BLUE GUM-TREE. (*Eucalyptus Globulus*. LABILLARDIERE.)

The "Blue Gum-tree" is indigenous to the south and east portions of Victoria, the southern part of New South Wales, and the southern portions of Tasmania, country lying between Lat. 35°—45° S. and Long. 140°—150° E. Naturally the species is restricted to the humid valleys of the mountainous country or to the lower slopes and ridges of forest ranges. It is usually found dispersed, but it is sometimes gregarious. In cultivation it will adapt itself to most varieties of soil, though it is quite adverse to saline ground and to soils containing much lime. Its climatic demands are equally varied. In Australia, the Blue Gum undoubtedly takes the first position in importance amongst indigenous trees, for while not attaining the enormous bulk of *E. amygdalina* or *E. diversicolor*, it easily surpasses either in early yield of fuel and timber, and for general purposes holds the most prominent place. Under exceptional conditions the Blue Gum attains a height of some 310—350 feet and a basal circumference of some 40 Feet. The timber is of pale colour, hard, heavy, strong and fairly durable with a specific gravity varying between .845 and 1.096. The strength of the timber is regarded as approximately the same as that of English Oak or American White Oak or Ash. The qualities of the timber vary however with the conditions under which it is grown. It is used locally for ship-building work, being classed 'A' by the Australian Lloyds for 8-12 years, according to its position in the ship. It is extensively used by carriage builders for poles, shafts, under carriage work, swivel trees, spokes, rims and felloes, axle beds &c; by implement makers,—for plough bars, pick, axe, shovel, fork, and hammer handles &c. In Victoria it is regarded as one of the best house building timbers for all purposes where timber of fairly heavy scantling is required. It is also occasionally used for railway sleepers, bridge and jetty decking, and telegraph poles &c. but usually for these purposes it is replaced by timber of the Red

Gum (*E. rostrata*) save in Tasmania where this species does not occur, for in durability the Blue Gum only occupies a medium position amongst its congeners. (In Oporto in Portugal, the Blue Gum is said to furnish excellent staves for wine casks, and that further these do not require soaking as is the case with Oak &c.) With others of its family the Blue Gum undoubtedly exercises a strong sanitary influence in localities where it is extensively grown, due to its water absorbing powers, corresponding powers of exhalation, its evolution of a highly antiseptic volatile oil, and the action of its dropped foliage on decaying organic matter. "Eucalyptus Oil" which owes its hygienic properties to its high oxidizing power, and is too well known to need more than mention here is largely manufactured from the leaves of the Blue Gum as well as from those of the *E. amygdalina* for while the average percentage of volatile oil in the foliage is only 0.719 as compared to 3.813 (Bosisto) the lesser quantity of oil in the former is compensated for by its copiousness of foliage.

The tree readily reproduces itself from seed, and is an excellent and certain coppicer. It flowers in the cool season. Clean seed is said to contain about 10,000 fertile seeds to the ounce, and to retain its germinative power for at least four years (Von Mueller). For artificial regeneration the Blue Gum probably presents the least difficulty of all the eucalypti, and its wide temperature limits and easily satisfied soil requirements render the species invaluable for plantation purposes. As regards temperature there is no doubt that a very high maximum can be safely experienced, but the minimum temperature should not be less than 20° Fahr. Instances are recorded where a lower temperature has been withstood, but naturally this immunity depends on the age of the tree, its situation as regards wind shelter, and the degree of contained soil moisture. In soil requirements the tree is most accommodating, and provided the soil is not calcareous or saline and that the substratum does not consist of an impenetrable rock, the Blue Gum will flourish in the most sterile regions, other conditions being possible. This fact is fully appreciated in Algeria. In moisture requirements the range is also wide, from moist and humid to almost arid. At Melbourne unhealthy trees were found to be subject to the attacks of wood boring insects, the larva of a moth (*Endoxyla Eucalypti*) and beetles (*Hapatesus hirtus* and *Phoracantha tricuspis*). Damage to young foliage by an *Aphis* has also been noticed in other localities.

The Blue Gum was introduced into Europe early in the last century, probably about 1820—1825. In 1829 specimens with those of *E. rostrata* and *E. amygdalina* existed in the Botanic Gardens at Naples, during the time of Dehnhardt. It was not until 1858 that the culture of the species, as a forest tree, was extensively recommended for the Mediterranean districts by M. Prosper Ramel. According to Planchon the species was introduced into Algeria about 1854, by seed obtained from the Jardin des Plantes of Paris. In this country of Algeria, the Blue Gum now plays an important

part in plantation and reforestation work, on account of its adaptability, its intrinsic value and its capacity to withstand the dreaded sirocco. In 1869 the Blue Gum was introduced into the Campagna Romana, at the Trappist Monastery of Tré Fontane, by Dr. J. A. Goold, then R. C. Bishop of Melbourne. The great improvement of the sanitary conditions of this fever stricken tract which followed the extensive planting of this species in this locality was generally ascribed to the influence of the Blue Gum, but a commission appointed by the Italian Government to enquire into the matter declared the improvement to be largely due to other causes. Isolated specimens are to be found in the Scilly Islands and the south of England, and in the mild climate of Arran N.B. the Blue Gum is said to flourish. Beside the Mediterranean region many parts of the world can now boast of the successful introduction of the exotic, and its establishment as a forest tree. In the Nilgiri Hills of Madras South India, at an elevation of over 6,000 feet, where it was introduced about 1843; Central Mexico, at an altitude of 2500 to 7000 feet; Mountains of Guatamala; Florida; California and the western states of North America; in the islands of Reunion and Mauritius, where it is somewhat subject to windbreak; in parts of the Cape Colony, Orange River Colony and the Transvaal Colony the Blue Gum flourishes. In the Southern States of North America the use of eucalyptus wood is being constantly extended, and in southern California it forms the exclusive source of rollers for the moving of buildings. The wood is also highly recommended for paving. Much eucalyptus oil is manufactured in California, almost exclusively from the Blue Gum (*E. globulus*). This tree is almost exclusively planted in South California where the plantations "far exceed in importance those of all other forest trees whatever" (Fernow. Bulletin No 11 Washington 1895). It is prized for the value of its fuel and piling, its rapid growth, hardiness, and vigour, besides its sanitary effects. Here it is found not to stand frosts below 25° Fahr when young, but temporary frosts down to 18° Fahr have been withstood by mature trees with "some frost burn." Although much has been written of the Blue Gum, most of it has been confined to its botanic and general aspects. There is little, at least known to the writer, treating of the species from a forestal point of view purely. In most instances where records of growth are given as evidence of its remarkable rate of growth, height figures only are given, though occasionally basal measurements are added, unfortunately it is very seldom stated where this basal measurement is taken, at what distance above the ground. The following are a few figures taken from different sources. Most of them are probably for isolated specimens under exceptional conditions and must be regarded as maximum measurements. Where authorities are possible they are given;—

RECORDED GROWTHS OF EUCALYPTUS GLOBULUS LAM.

Country or Place	Age in Years	Height Growth in Feet		Authority
		Total	Mean Annual	
Nilgiri Hills	15	25	16 66	B & C
Uman	2	15	7 50	I. Van Wernau
Nilgiri Hills	4	30	7 50	Brace
Florida	4	40	10 00	Von Mueller
Malaga	6	65	10 83	Pluncho
Jamaica	7	0	4 57	Von Mueller
California	11	60	5 45	Von Mueller
Nilgiri Hills	12	100	8 50	Brace
Guatemala Mountains	12	120	10 00	Boucard
Hyeres	15	67	4 17	Dr. Havard Wattel
Gaeta (Rome)	21	100	4 17	Conte Lodioli
Lago Maggiore	28	120	4 25	Dr. W. Von Ham

According to Cruikshank, in Algeria and Portugal the Blue Gum furnishes railway sleepers in eight years, and telegraph poles in ten. The above figures, though interesting are not of great value to the forester, as no growth conditions are given. Fortunately however figures based on forestal requirements exist for the growth of the Blue Gum on the Nilgiri Hills, Madras. These were prepared by Mr. D. E. Hutchins, now Conservator of Forests, Cape Town, and were published in a paper entitled "Report of the Measurements of the Growth of Australian Trees on the Nilgiris" Government Press, Madras, 1883. From this report I have extracted a few figures, which are now given —

Plantation	Age in Years	Average Height in Feet	Average Growth in Inches	No. of Trees on ground Reduc- on mea- in, fac- surement for per acre		Acre Figures in Cubic Feet and Tons (2,240 lbs) Weight	
				Stock in Cubic ft	Increment in dry W. (in tons) 1 C Ft = 10 lbs		
Bathri	5	50 97	14 5	847 1	171	2960	10 59
Blackbridge	6	37 46	10 61	980 00	470	2151	6 395
Old Forest	9	57 23	16 13	1045 41	157	5963	11 832
Norwood	10	84 57	23 33	411 00	147	6829	12 196
Raha	10	70 72	24 60	523 13	150	6960	12 425
Newman	12	55 76	15 78	132 50	453	6792	10 107
Arambi	13	77 03	26 62	418 55	1503	9031	8 58
Marlhumd	22	108 11	58 71	511	430	5937	1 867

NB—The acre figures given are for standing stock only, thinning and blanks and the total figures obtained thereby have been discarded as it is considered that the allowance made has been too large and that their effect on the general increment growth of the standing stock has not been sufficiently considered. Again the method employed for arriving at the class form factor admits of large error, as the trees chosen for measurement do not represent the means of inch or other basal area classes.

For purposes of comparison with the growths of the Blue Gum in the South Outeniqua Belt in this Conservancy, I have selected a few of Mr. D. E. Hutchin's figures which are now given:—

Plantation.	Age in Years.	Height of Stock in Feet.		Total stand- ing Stock per Acre.	Mean Annual Periodic In- crement per Acre.
		Mean Actual Trees	Mean Growth per annum.	In Cubic Feet.	
Bathri ..	5	50 97	10-19	2966	598
Blackbridge ..	6	37 46	6 24	2151	358
Old Forest ..	9	57 23	6-36	5963	662
Norwood ..	10	84 87	8-49	6829	683
Italia ..	10	70 72	7-07	6960	696
Newman ..	12	58 76	4-90	6792	566
Arambi ..	19	97 00	4 05	9031	475
Brookland ..	20	75 61	3 78	8636	431
Marlimund ..	22	105 19	1-93	6097	273

This statement concludes the first portion of this report. The factors of the locality which obtain in the Southern Outeniqua belt have been discussed at some length. How these factors affect tree growth have been briefly touched on. The Blue Gum as occurring in its native habitat, and the estimation in which the species is there held has been considered. Its introduction into other parts of the world and the success there attained has been mentioned, and it now remains to treat of the introduction of the tree into this locality and to judge of the success attained under conditions enumerated as compared with that attained in other parts of the world. It is to be regretted that records of this are so sketchy and poor, with the exception of that for the Nilgiris (Mr. Hutchin's admirable paper), but unfortunately with the limited time at my disposal I have been unable to attempt to obtain those which undoubtedly exist in the French Forest Department archives, for the Blue Gum in Algeria &c. A good deal has been written of the species in Southern California etc., but unfortunately most if not all of it in my possession is of a non technical nature and conveys but little exact information to the mind forestal.

THE BLUE GUM IN THE SOUTH OUTENIQUA BELT.

The Blue Gum appears to have been first introduced into the Knysna District about the year 1850-1851. Seeds were obtained from the Botanical Gardens Cape Town, then under the curatorship of the late Mr. McGibbon, by the late Captain Duthie, who successfully raised them and put out the young transplants in the form of avenues on his property, "Belvidere." To-day few of the original trees exist. having been gradually removed for varying reasons. It was found that even at the comparatively early age of

40-50 years several were subject to heart decay, a common feature in the larger specimens in Tasmania. Recently the writer measured one of the few remaining individuals and arrived at the following figures.—

Diameter at 4ft 3in. above ground	5.5 Feet
Basal Area	.. 28.0488 Sq Feet
Height ...	... 84 Feet

The tree was much branched with a comparatively short clear bole, the crown covering an area of some 10 acres. About July 1862 a Mr. Lange, then Civil Commissioner's Clerk at Knysna, obtained, it is said, some transplants from Cape Town and planted them out round the Gaol, English Church and in front of a house locally known as "Blake's," then the property of the late Mr. Horn. Most of these have disappeared but a few still exist in front of the house mentioned. These were measured and the five trees, originally planted some 12 feet apart along the road, give the following mean figures:

Diameter at 4 ft. 3 in. above ground	.. 3.0 Feet
Basal Area do	.. 7.0686 Sq. Feet
Mean Height ...	... 110 Feet

Three of the trees show fine boles.

It is claimed that the Blue Gum was introduced into the George District about the same time as at Belvidere, and that certain two rows of trees situated on either side of the square before the Dutch Reformed Church, George Town are about fifty years old. If this be so their growth is inferior to that of the individuals just mentioned, for the measurements of some fourteen show:—

Mean Diameter at 4 ft. 3 in. above ground	.. 2.4 Feet
Mean Basal Area at 4 ft. 3 in. above ground	.. 4.5869 Sq Feet
Mean Height ...	... 90.25 Feet

On many farms throughout the two districts the species has been successfully established, but usually by solitary rows, isolated individuals or very small groups. In the Long Kloof, on the farm "Schoonberg" the acclimatization has been most successful, but this area is beyond the scope of the report and an account of it may be seen under a report on the "Government Tree Planting Competition" in the Agricultural Journal Vol. XIX. No. 6, September 12th, 1901.

The establishment of a Blue Gum plantation in the South Outeniqua Coast belt, is possibly the easiest task set to the forester or planter. Seed of excellent quality can easily be obtained locally at a comparatively small cost, about 2s. 6d. per lb. If rough unbroken veld, the ground requires a good ploughing and thorough harrowing the season prior to the establishment of the young plants.

The plantation can be started by sowing the seed in prepared pits as is done in the Long Kloof, a method which has its advantages under the condition which there exist, but the usual plan of putting out once transplanted seedlings some 5 to 10 inches high is to be preferred here. The seed in a properly prepared seedbed germinates rapidly, seedlings have been known to appear in 6-7 days after sowing, and as 1 oz of clean seed contains about 10,000 fertile seeds, which retain their germinative power for fourteen years or more, the cost of obtaining seedlings is but fractional. These seedlings are soon in a condition to be handled and pricked out and in about 6 to 8 weeks after sowing, under favourable conditions, the young transplants are in a fit state to be permanently placed. Here summer and autumn sowings and plantings are to be preferred for while under the exceptional climatic conditions which exist these operations can be carried out throughout the year, winter planting has its drawbacks in the danger of the berg winds setting in before the young transplants are "settled in" which would mean heavy loss. During the earlier stages of growth, sometimes up to two years of age, the young plantation must be kept clear of weeds &c., as the Blue Gum is easily suppressed or rendered "weedy" and useless. Once 8 to 10 feet high little further is necessary, save fire protection and careful thinnings. It has been said that the species lends itself readily to the life conditions under which it is placed, but if these be very unfavourable, their effect will ere long be evident. The tree, like many of its tall congeners, requires for its full development, a depth of soil, even if this soil be ever so fertile. If the substratum be impenetrable to the roots of the tree, the effect is soon noticed in the dwarfing of the height growth, and the tendency to bush. As regards the quality of the soil almost any will support the species, though, naturally, growth is more or less proportionate to favourable physical conditions. Waterlogged or brak soils are the least liked. A couple of years ago an instance of the objection the species has to a saline soil was seen on the Knysna Vlei ground, adjoining the river estuary. Some trees which had been established in a very low lying locality some years were noticed after a heavy pale and unusually high tide to droop, wither and finally die. This was undoubtedly due to the rising of the level of the saline substratum of water underlying the vlei ground, its contact with the root system of the trees and their perishing.

Situated within practically the same summer isothermals as its native habitat, though our winters are slightly warmer, the climatic factors of the locality are eminently favourable to the successful growth of the species. The danger of frost is inappreciable. On the hot North-west aspects, facing the direction of the berg winds occasional "bark burn" is to be noticed on outside or edge individuals, but the damage occasioned is small. Wind causes but little loss, though occasionally heavy crowns or limbs when loaded with seed capsules are broken off in storms, which also occasionally cause

windfalls among the edge trees in young plantations after heavy rains. Once well established the species is fairly storm firm.

In Uniondale the writer has noticed snow break but a fall of snow is unknown in this locality.

The species appears to be singularly free from disease and no instance has been noticed of insect attack with the exception of very occasional cases of aphid on young trees in the first leaves. Cattle do not as a rule attack the species though under exceptional conditions they are said to have been fed on the foliage. On the whole the tree is singularly immune from the many dangers which threaten young plantations and the fact that it so readily coppices from even very young stools renders recovery almost certain from possible mishap, as may be instanced Harkerville Plantation (No. 12) which now shows such excellent increment figures representing the regrowth from two year old stools which had been prepared after fire had very severely scorched the young stock.

A few figures on the cost of laying down a young plantation may perhaps be of interest. Block XIV George Plantation 4 years old, and now well established, may be taken as an instance. (No. 5).

Area of Block	...	..	...	20 Acres
Cost of Clearing, ploughing and Harrowing	...	£19	0	0
Cost of plants :—				
24094 original planting				
6351 refillings				
30445 at 3s., per 100 (tariff rate)	...	45	13	6
Cost of Pitting, Pits 12in. x 12in. x 12in., 6ft. x 6ft. apart	12	17	6	
Cost of Planting and refilling	...	5	4	9
Cost of occasional watering	...	0	14	0
Cost of Cleaning, from March 1898 to July 1900				
practically three operations	...	44	13	1
Total...	...	£128	1	10
Total Cost per Acre	..	...	6	8 1

Assuming that future cultural operations will pay by the produce yielded their cost, in 45 years each acre will have cost £19.44, again assuming that the money can be borrowed at 2½ per cent.

No soil value has been included as the cost has not been borne by Government, the land having been presented to them. Its value is probably about £1 per acre, which would increase otherwise the cost per acre by £30.379. To a private individual, paying for the land and unable to borrow the money under 5 per cent. the cost at the end of 45 years would be £68.4890. Possibly the yield of the final rotation would be 20,000 cubic feet, say with a value of 1d. per cube all round. This would give the Government a clear profit of £63.89

per acre and the private individual a clear profit of £14·84 or a mean annual profit of £1·42 and £·83 respectively on a capital of £6 8s. 1d., and £7 8s. 1d., invested.

The plantations in the Midland Conservancy may roughly be divided into two classes—those established on burnt forest soils and those situated on poor “sourveld” localities. This division has been observed in the various tabulated statistical tables given. It is to be noted that height growth as an indicator of locality is a reliable guide.

In Appendices II and III is given the whole of the statistical information arranged in tabular form to permit of easy reference. In Appendix IV is shown graphically obvious deductions from the figures given in the preceding statements. For the figures themselves only approximate correctness can be claimed as the method employed for their calculation is not the most exact, time not permitting for a more detailed examination, but for all practical purposes they are sufficient.

From the figures given it will be seen that the growth of the Blue Gum in this locality is astonishing and that Class I compares in growth with the Nilgiri Plantations though possibly the growth in the earlier stages 1 to 5 years is not so rapid. The mean of the two 10 years old Nilgiri Plantations (Norwood and Ralia) show Height-77·39 Feet Mean Periodic Annual Increment—689·50 Cubic Feet, and a plantation of the same age here-Glenhoek-Harkerville (No 10)-Height-66 Feet, Mean Annual Periodic Increment 613·30 Cubic Feet. A plantation only five years older-Kraaibosch, Farleigh (No 11) shows-Height-70 Feet, Mean Periodic Annual Increment 755·23 Cubic Feet. Gouna Plantation (No 7) of the same age as Blackbridge Plantation in the Nilgiris shows a Height of 54 Feet and a Mean Periodic Annual Increment of 433·50 Cubic Feet, against a Height of 37·46 Feet and a Mean Periodic Annual Increment of 358 Cubic Feet. Knysna Office Plantation (No 13) 12 years old gives a Height of 70 feet and a Mean Periodic Annual Increment of 867·66 Cubic Feet against a Height of 58·76 and a Mean Periodic Annual Increment of 566 Cubic Feet for Newman Plantation of the same age, but as has been said the Knysna Office figures are calculated from so small a block that they undoubtedly are extreme.

Roughly Class I may be said to show a mean height of 35-90 feet and a mean annual periodic increment of 250-750 Cubic feet for plantations varying in age from 3 to 12 years. Class II should give figures about a little more than one half these returns though naturally the figures in early youth would be largely affected by the preparation the soil receives prior to planting out. When it is remembered that this return is won from a soil practically incapable with the same preparation of producing the very scantiest of field crops, the value and success of the Blue Gum cannot be doubted.

STOCKING.

In glancing through the figures given for both classes a

particular feature at once catches the eye—the great difference in the diameter classes of the same wood and the large percentage of blanks. Of course the plantations under report are practically in their early youth and the difference in the diameters of individuals in the same wood will be lessened as time advances, but the two facts taken in conjunction clearly point to a conclusion that the Blue Gum requires a full growing space. In the records given it is to be noted that by far the best figures both in height and volume increments are found where the smallest number of individuals per acre exist. True the figures for the Knysna Office block are very high and the individuals originally planted 8ft. x 8ft. show a small failure per centage but it must be borne in mind that the majority of these trees measured are outside or edge trees, the block being so small. The most astonishing return is that for the Concordia Avenue (No. 14) where with a mean annual height growth of 5·9 feet for 11 years growth, a double row of trees planted 6ft. x 4ft. apart show an acreage return of 18075 Cubic Feet and a mean periodic annual increment of 1643·18 Cubic Feet. General experience tends to clearly point that 6ft. x 6ft. should in almost all cases be the *minimum distance* to plant, but that, especially in the more favourable localities which naturally carry later the fewer individuals 8ft. x 8ft. is quite close enough. If closer planting is advisable in instances, where heavy weed growth is to be feared, early thinning is absolutely necessary, for the species shoots up rapidly and if thinning be too long delayed the crop tends to become weedy and crown heavy. The tree is naturally of a straight growing and erect habit, and provided that the stocking is sufficiently dense to ensure this and to prevent damage by wind a sufficient growing space is the most important point in the tending of these plantations.

GROWTH.

The Blue Gum when first planted out a few inches high especially in newly prepared "sour veld" soil very often hangs back and makes but comparatively slow growth for some six to twelve months, but when once fairly started the growth is steady and rapid and put on principally in the autumn months. The current annual increment may be regarded as one which steadily increases from the establishment of the plantation up to at any rate 15 years of age, though possibly until later. This current annual increment should never be confounded with the mean annual increment for these two will not coincide until the former has culminated and fallen. At what age this current annual increment will culminate it is difficult with existing data to determine but it is probable that this will happen between the ages of 15 and 20 years.

Graphic representations of the increment growths are given in Appendix IV.

VALUES AND USES OF BLUE GUM TIMBER LOCALLY GROWN.

While the volume increments for different ages are expressed in the same unit and are compared, it is naturally impossible to estimate the commercial value of the returns by a like comparison. A cubic foot of timber in a plantation say three years old cannot have the same value as a cubic foot of the same timber in a plantation say twenty years of age, for more than obvious reasons. Before a foot of timber can have a commercial value it must be presented in a commercial and saleable scantling. When the object of a plantation is a supply of fuel, a financial return is possible much sooner than where timber of a large size is the desideratum, and again the value per unit of fuel and timber would probably differ very appreciably. Therefore in estimating the value of a plantation and the time for realization, the objects of management and the market requirements must be definitely known. If fuel be the object, the rotation, or period which must elapse before realization, would be determined by quantity figures, but where, say, sleeper wood is the requirement, quality would have to temper quantity. There can be little doubt that the object of Blue Gum Plantations in this Conservancy must be timber for railway sleepers or for heavy bridge and other work requiring wood in large scantling, for fuel requirements can be easily filled under all probable conditions from the necessary thinnings and waste. This being so the rotation will be determined by the time requisite for the production of the largest number of railway sleepers of a definite dimension per acre at the lowest cost, a blending of the financial with the highest quality and quantity rotation combined. Quite insufficient data exist at present for this determination but what do, seem to point to a rotation of about 40 to 50 years? There is little that can be gathered of the uses that locally grown Blue Gum timber can be satisfactorily put to. What has been utilized has been principally used as a fuel, for which purpose it is said to be excellent. At Belvidere a small quantity has been converted into rough boarding and fencing posts, but this only comparatively lately, and sufficient time has not elapsed to permit an opinion of its quality to be formed. Laslet in his "Timber and Timber Trees" does not give the timber a high reputation, remarking on its twisted and curled grain, tendency to warp and liability to deep and fine shakes. In the Long Kloof, a few miles from George, on the northern side of the Outeniqua Mountains, the writer has seen the wood used for almost every farm purpose, including carts, wagons, and household furniture, &c., with excellent results, and in its native country it also finds appreciation. There can be no doubt that in common with many species the value of its timber will depend on the condition of growth, and it cannot but be held in view of all circumstances that the outlook for the timber as a generally useful one is hopeful. There is, and there probably will be, a prejudice against it, based on experience gained from a trial of a timber grown and seasoned under most disadvantageous conditions, but if the quality is there this can

be overcome, As a fuel it is undoubtedly good, but it should be split green, as the nature of the wood with its curly fibres with their often forked apices renders it not easily fissile when dry. In a growing country like South Africa the possibility of the manufacture of subsidiary products, such as charcoal, wood spirits, tar oil, essential oil (Eucalyptus Oil), &c., may afford an opportunity of utilizing the otherwise waste material, opening up minor industries, and increasing financial returns.

To sum up there can be little doubt that the introduction of the Blue Gum has been eminently satisfactory, and that it is a species which has proved itself as thoroughly satisfied with the factors of locality. There also can be no doubt that it is one of the most generally useful and valuable exotics yet introduced, and that while other eucalypts etc., may be as profitably grown for definite purposes, the *Eucalyptus globulus* will prove the most advantageous for the small grower to cultivate, and that no farm situated in a locality suitable to the species should be without its few acres of plantation which cannot fail to pay over and over again its cost of establishment whether by a yield of fuel or timber. Its introduction should be as widely recommended as possible.

EUCALYPTUS GLOBULUS.

APPENDIX II.

GROWTH AND INCREMENT FIGURES &c. IN THE MIDLAND CONSERVANCY.

Station	Plantation	Class	Sample Area of Plantation					Acre Increments			Remarks	Refer. No.		
			Age in Years	Area in Acres	Distance Individuals planted apart in feet	Percentage of Blanks	Mean Height in Feet	Volume in Cubic Feet	Arith. Mean Sample Tree					
									Basal Area in Cub. Ft.	High in Feet			Actual Stock on ground in Cubic Feet per Acre	Mean Annual Periodic Increment in Cubic Feet
Storms River	Wit Klips	I	3-5	1433	3 x 5	.163	36	135-12	.0276	36	943	279-42		3
	Gouna	I	6-0	1000	6 x 6	.341	54	260-12	.1113	54	2601	433-50		7
	Kraalbosch	I	7-0	0161	4 x 4	.15	42	85-78	.0936	42	5328	761-29		8
	Glen Hoek	I	10-0	1360	5 x 5	.66	66	772-78	.4667	66	6133	613-30		10
	Kraalbosch	I	10-5	1000	Irregular		70	893-04	.4626	70	7930	755-23	*	11
	Harkerville	I	11-0	1000	6 x 6	.82	90	684-73	.9541	90	6847	622-45		12
Knysna	Knysna Office	I	12-0	0132	8 x 8	.11	70	137-45	.7708	70	10412	867-66	†	13
Concordia	West Kloof	II	3-0	2314	6 x 6	.137	25	69-72	.0236	25	301	100-43		1
Bier Vlei	Bier Vlei	II	3-5	5000	6 x 6	.11	25	307-03	.0411	25	614	175-44		2
Concordia	East Kloof	II	4-0	2314	6 x 6	.17	30	144-90	.0431	30	626	156-55		4
George Plantn.	Blk. XIII	II	4-0	5000	6 x 6	.118	25	388-66	.0457	25	777	194-33		5
Concordia	Barrack Ridge	II	5-0	2314	8 x 8	.088	30	127-89	.0504	30	531	110-60	†	6
Concordia	Main Ridge	II	10-0	2314	6 x 4	.447	52	719-82	.1236	52	3110	311-00		9

* Very exceptional growth. Transplants put in irregularly in a patch of newly burnt forest.

† This sample is taken from a small isolated block of trees growing under very favourable circumstances. The sample consists of almost half the block and is given as an indication of the growth of isolated patches of Blue Gum.

‡ An exceptionally dry and unfavourable locality where little else would grow. May be taken as a minimum.

C. H. McNAUGHTON, Conservator of Forests, M.C.

Office of the Conservator of Forests, Midland Conservancy,
17th January 1902.

APPENDIX III.

EUCALYPTUS GLOBULUS (BLUE GUM).

GROWTH AND INCREMENT FIGURES IN THE MIDLAND CONSERVANCY.

HEIGHT GROWTHS AND INCREMENTS.

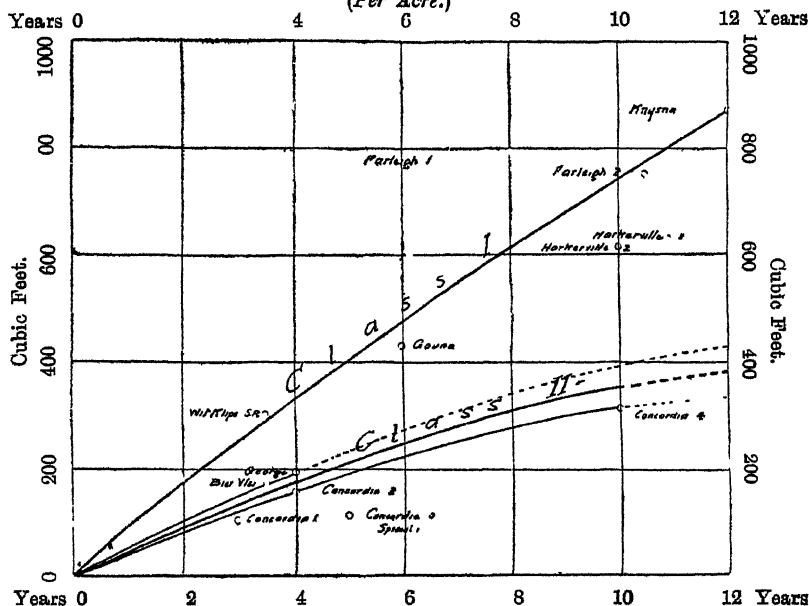
Plantation	Class	Refer. Num- ber	Age in Years	Height Figures &c.		Remarks
				Mean Height in Feet	Mean Annual Periodic Increment in Feet	
Wit Klips	..	3	35	36	10 17	
Gouna	..	7	60	54	9 00	
Kraaibosch	..	5	70	42	6 00	Exceptional
Glen Hoek	..	10	100	66	6 60	
Kraaibosch	..	I 11	105	70	6 66	Exceptional
Harkerville	..	12	110	90	8 18	
Knysna Office	..	13	120	70	5 83	Calculated from small block
West Kloof	..	II 1	30	25	8 33	
Biet Vlei	..	II 2	35	25	7 14	
East Kloof	..	II 4	40	30	7 50	
Block XIII	..	II 5	40	25	6 25	
Barrack Ridge	..	II 6	50	30	6 00	Poor locality
Main Ridge	..	II 9	100	52	5 20	

EUCALYPTUS IN THE MIDLAND CONSERVANCY.

I. VOLUME INCREMENTS.

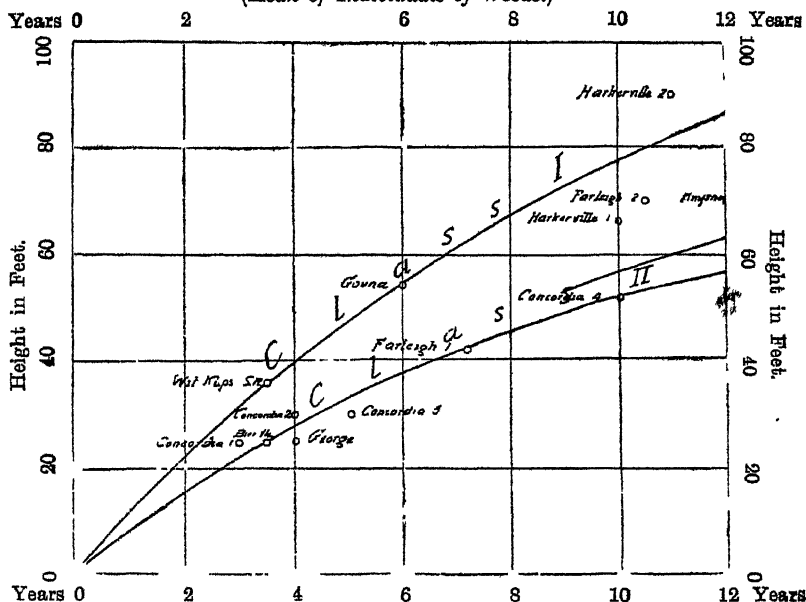
APPENDIX IV.

(Per Acre.)



II. HEIGHT INCREMENTS.

(Mean of Individuals of Woods.)



APPENDIX V.

EUCALYPTUS GLOBULUS.

GROWTH AND INCREMENT FIGURES &c. IN THE MIDLAND CONSERVANCY C.O.

A TABLE

OF

FORM OR REDUCING FACTORS AS CALCULATED FROM THE MEASUREMENTS OF THE
FELLED SAMPLE TREES IN THE VARIOUS PLANTATIONS AND BLOCKS.

Plantation	Class	No.	Sample Trees				Volume of a correspon- ding cylinder in Cubic Feet	Reducing or Form Factor
			Diam.	Basal Area	Length	Volume		
			in Inches	in Square Feet	in Feet	in Cubic Feet		
West Kloof	II	1	1·8	·0177	19·5	1983	·9452	·57
		2	1·8	·0177	22·5	·2453	·3982	·61
		3	1·9	·0197	22·5	·2453	·4433	·55
Bier Vlei	II	1	2·2	·0264	23	·3583	·6072	·59
		2	2·4	·0314	24	·4347	·7536	·58
		3	2·4	·0314	22·5	·3935	·7065	·56
East Kloof	II	1	2·6	·0369	29	·5600	1·0701	·51
		2	2·6	·0369	28·5	·5395	1·0517	·51
		3	2·7	·0398	27	·5697	1·0746	·53
Barrack Ridge	II	1	2·8	·0428	27	·6462	1·1556	·56
		2	2·9	·0459	25·5	·7164	1·1705	·61
		3	2·95	·0475	30	·7880	1·4250	·55
George Block XIII	II	1	3·0	·0491	27·5	·6822	1·3503	·51
		2	3·1	·0524	32	·8400	1·6768	·50
		3	4·2	·0963	52·5	2·6255	5·0558	·52
Main Ridge	II	1	4·3	·1009	52	2·5997	5·2468	·52
		2	4·3	·1009	51	2·6325	5·1459	·51
Wit Klips	I	3	2·5	·0341	30	·3975	1·0230	·39
		2	3·5	·0668	36	1·1136	2·4048	·46
		1	3·8	·0788	36	1·0614	2·8368	·37
Kraaibosch	I	1	3·5	·0669	45	1·5534	3·0205	·50
Gouna	I	1	4·0	·0873	51	2·0796	4·4523	·47
Kraaibosch	I	2	4·0	·0873	41	1·5858	3·5793	·44
Glen Hoek	I	1	7·65	·3190	70	10·4742	22·3300	·46
Kraaibosch	I	2	8·0	·3491	75	10·7985	26·1825	·41
		2	8·5	·3941	71	8·7484	27·9811	·31
		1	8·6	·4034	66·5	11·0206	26·8261	·41
Krynsna Office	I	3	8·8	·4224	58·5	9·6840	24·7104	·39
		1	10·4	·5900	62	13·1535	36·5800	·36
		2	12·9	·9076	90	29·9958	81·6840	·37
Harkerville	I	1	13·0	·9218	90	29·6229	82·9620	·36

THE DROPPING OF PEACH TREE BUDS.

One of the many surprises sprung upon the fruit-grower this season on account of the eccentricities of weather is the success of varieties of peaches like Early Alexander, Briggs, B. R. May and others in respect to fruit-production.

It will be remembered how for years past complaints were annually heard that some varieties of peaches failed year after year to produce a crop in consequence of their buds, on previous years' wood, dropping during the latter part of the winter or early part of spring; a phenomenon to which attention was drawn in the *Agricultural Journal* of 1898 and which so far occurred in a smaller or larger degree regularly every season. This year we have none of it and from everywhere reports have been received that these varieties bear well.

The question arises now to what is this sudden change in the attitude of these peach-trees due, is it that the trees have required a longer period to acquire full bearing propensities? Or is it the result of the influence in the change of cultural conditions?

Judging from the fact that during the past years referred to, the above-mentioned varieties have actually borne fruit in isolated cases whenever they were well protected against the influences of sudden changes in weather, the theory of a longer period to reach bearing age having been required can reasonably be dismissed, and I feel inclined personally to ascribe the difference in fructification between this year and past years entirely to the greater absence of warm sunny days during last winter than we generally experience in the fruit-growing districts of the West.

Casual observance of nature will show anybody that the growth of plants depends upon the presence of a certain amount of warmth, and that the degree of warmth required to produce vegetation varies with the kind and description of plant. Hence certain plants may be cultivated with us during winter which would not succeed so well in summer and *vice versa*, others may be grown during summer which would not answer during winter. Most of our fruit trees belong to the latter type, showing however, striking differences in respect to the period at which vegetation begins, thus proving that each variety of tree possesses a physiological individuality upon which its adaptation to certain localities depends in a large degree. Take for example two representatives of the pear, say the Keiffer and Bon Chretien pear. While the former has completed flowering and produced almost its entire foliage, the latter stands almost dormant starting its vegetation about a month later or thereabouts. The same holds good in regard to peaches. Seedling peaches for example occasionally found on farms, display as a rule their flowers much earlier than the standard varieties commonly cultivated, and

among the latter we find the same differences. In consequence, some are earlier than others and that explains the success or non-success of the different varieties.

It is generally assumed that trees are in a dormant state during winter. Though this may be correct in climates colder than ours, it does not hold good with us as observations during a number of years have ripened my conviction of the existence of vegetation going on at that period of the year, consisting of a perceptible swelling or growth of buds before root action can take place ; that this swelling of buds is due to the influence of heat absorbed by trees in a smaller or larger degree according to a lighter or darker colouration of trees, branches, or twigs. Considering these points, it will be readily understood that the buds of trees, capable of absorbing the heat during warm sunny winter days, advance more quickly and are therefore more likely to suffer, whenever a period of cold, windy or rainy weather sets in, so frequently experienced in the early spring. The occurrence of such weather would act as a temporary check on vegetation, causing for the time being starvation of the buds which consequently detach themselves from the shoots and drop off, leaving the trees to form new ones which in the nature of things will only be wood buds.

As we had not many sunny days during last winter but a continuous run of cool and wet weather, the buds of peach trees did not swell to the same extent as in previous years. They remained in a state of dormancy, developing gradually ; they were not exposed to these sudden and marked changes in temperature and therefore not liable to suffer in the above described way, so that this difference of climatic conditions experienced this season, as against other years, would explain why these varieties, unsuccessful hitherto, show a satisfactory crop of fruit. This year's success would in no way establish a guaranty as to the behaviour of such trees in the future.

Unfortunately no opportunities were given for observations in that direction, but I feel certain that, if the heat absorbing capacity of the various varieties of peach trees would be measured for a season or two ; it would probably be found that the varieties, liable to shed their buds, show an increased temperature due to an increased absorption of heat.

If this be correct, a little reflection will at once suggest the most likely remedy by which the dropping of buds would be averted, namely whitening the trees, so that the heat may be more reflected than absorbed. The Government Assistant Entomologist, who conducted during last winter experiments at the Cape Orchard Company with different sprays against the leaf-moth on prune trees and with whom I discussed the question of bud-dropping, tells me that in these experiments the use of dark coloured sprays distinctly hastened budding whilst light coloured sprays retarded budding so that there was a noticeable difference in the period at which these trees started into foliage, which would only be accounted for by the influence of these sprays. It would therefore be desirable that in the

near future some trials be made to ascertain whether or not the dropping of peach buds can be averted in this way. In other words whether whitening will prove commercially profitable.

C.M.

ANGORA GOAT BREEDERS' ASSOCIATION.

ANNUAL MEETING.

The Annual meeting of the Angora Goat Breeders' Association was held at Graaff-Reinet on the 30th of October.

The following members were present: Messrs. S. B. Hobson, Vice-President; C. G. Lee, Secretary; R. F. Huradall, P. Hobson, W. Hobson, R. Holmes, A. Hobson.

A letter was read from Mr. J. Kirkman, Nashville. He drew the attention of the meeting to the question of accepting stock other than those on the Stud Book or their progeny as laid down in the Association's rules. He suggested that fresh stock be accepted for the next three years.

Mr. J. H. Biggs wrote urging, on account of the untoward circumstances of the past few years, that fresh stock be accepted for inspection for another year. He would state why that was necessary. Of his registered rams he was able only to place a few with his second inspection ewes, for the reason that they were not as satisfactory as they might be.

Mr. C. Lee, M.L.A., wrote drawing attention to the necessity of dealing with the question of the disposal of mohair to the best advantage; also the question of heavy and fine hair. He suggested that the present meeting so pass its resolutions that they would be subject to amendment at the next meeting, and that the present meeting, on the completion of its work, should not close the proceedings but adjourn them.

ANNUAL REPORT.

The following report was read by the Secretary:—

I have the honour to submit a report of the Association's work accomplished since the last annual meeting, which was held in Port Elizabeth on the 7th April 1899, three and a half years ago. During that time two attempts were made to hold a general annual meeting, but without success, because members were unable to attend, the first attempt being made in April, 1900, twelve months after the last annual gathering.

However, the Executive then met and resolved to ask those of the office-bearers, who are elected annually, to retain office, until you were able to meet again, and this has been done.

The Executive Committee have met twice and under trying circumstances; the restrictions of Martial Law made it impossible to have met more frequently. At those two meetings, the reports upon 1,300 goats have been considered, and of that number 120 passed the third examination and are entered permanently in the Association's books, while the balance, excepting those rejected, are undergoing their second and third year of trial.

The member roll has not increased since my last annual report, but stands, as then, at 23 members.

This may at first sight appear to be a poor 3½ years' work, but it must be remembered that war has been raging in the country during almost the whole of that period, making it impossible to hold meetings—causing members no end of trouble to get goats examined, and then having to wait a very long time for reports upon their stock examined, thus causing considerable disappointment and loss. As may easily be imagined, all this may have tended to check the work of the Society. Allow me to add that, as secretary, naturally, I am brought into touch with the members, which affords me the opportunity of realising some of the up-hill work encountered by members while preserving and improving the breed of their stock, during the perilous times referred to. Such determination as has been exhibited by members must serve as an example for good to us, and others who may join us in this work of registering the purest blood we are able to select from amongst our flocks.

Your secretary has been bound to take a good deal upon himself during the disturbed times in the way of meeting extraordinary circumstances and perhaps some rules of lesser importance have been set aside for the time, with the aim of working out the main object of the association, and this responsibility has been keenly felt by me, and I hope that the work which I have left undone may meet with your mildest disapproval. One thing is clear, that great care has been bestowed upon the examination of each goat accepted, and it has been said that we are too strict in the carrying out of this work of registering our stock—that is the view, not only of some outsiders in our own country, but also of some further afield who are interested in the Angora industry.

Before closing another feature has presented itself, that is—some members discover disappointment with a few of the stock even after they have passed the three examinations prescribed by the Association's rules; that of course is to be expected when we remember the unaccountable fact of "throw backs" appearing, but the assurance remains that each year the Association lives, there will be less danger of these disappointments, for it is to be remembered that the Society has not been registering stock for 20 or 30 years, but for six only. Again it must be gratifying to you to know that most of the best breeders of the Midlands are now linked to the Association, thus showing the approval of this world-wide recognised method of preserving and improving the purest and best from amongst their Stud Stock.

All members readily admit that there are energetic, careful and wise breeders of Angoras who are not members, who have first class stock, and had it not been for the war and its damaging influences upon such an institution as this, we may be sure more of the good breeders, who are to-day outsiders would have joined us, and whose membership would have been most helpful to this society, the aim of which is to the betterment of our Angoras. I cannot close this report without mentioning the splendid help rendered by those who assisted in the work of inspection.

As Treasurer I have pleasure in placing before you the financial statement, which shows a credit balance of £30 13s.

The following members had goats passed :—

R. C. Holmes, Karee Hoek ; R. Cawood, Ganna Hoek ; J. Hobson, & Son, Harefield ; Jonathan H. Hobson, Jackson ; P. E. Hobson, Ebenezer ; A. B. Hobson, Martyrsford ; C. G. Lee, Klipplaat ; Featherstone Bros, Vrede ; James Kirkman, Nashvale ; James H. Biggs Wellfound ; H. A. Holmes, Kendrew ; A. T. Parkes, Wheatlands ; R. F. Hurndall, Somerville ; F. C. Bayley, Jackals Kuil ; T. H. Moolman, Prospect ; J. E. Hobson, Shirlands.

Mr. Hurndall said he thought that part of the report which dealt with the disappointments which some breeders had suffered in their registered goats should be struck out ; there were people who were only too ready to throw stones at the Association. He would move that the paragraph be deleted ; seconded by Mr. Holmes.

Mr. P. Hobson said that what the report contained was only the truth. It was only to be expected that the Association's members should experience some disappointment in the beginning. On the whole, however, the Association has reason to be proud of its work. He would move as an amendment that the paragraph stand.

Mr. S. B. Hobson said he would be sorry if the paragraph alluded to was struck out. It would then not be a true report. It was not to the discredit of the Association that such things happened, when they came to think what a tricky animal the Angora was to breed from. The matter of "throwing back" would remedy itself in time. The rules of the Association were most stringent, as would be seen from the fact that of 1,300, only 120 had passed the final test. With the judges the Association had, he could state with confidence that the animals on the Stud Book counted some of the best goats in South Africa and in Turkey.

Mr. P. Hobson's amendment was carried. The adoption of the report and balance sheet was then moved and carried.

Mr. S. B. Hobson moved a hearty vote of thanks to the Secretary, Mr. C. G. Lee, for his untiring and successful efforts in the interest of the Association. For the past seven years Mr. Lee, he said, had carried on the secretarial work without remuneration, and the best thanks of the association were due to him. The volume of work he had to deal with was, as the Executive knew, very large, and Mr. Lee had given the utmost satisfaction.

The motion was carried unanimously.

OFFICE BEARERS.

Mr. Hurndall moved that the retiring officers be re-elected. Seconded by Mr. P. Hobson and carried.

Mr. S. B. Hobson said he thanked the meeting for the honour done to him, and he thanked them too on behalf of the absent President. He had not, on account of unavoidable circumstances, been able to do much for the association during the past two years, but he hoped to do good work in the future. He took a keen interest in the association and regarded its future as most hopeful. He did not hesitate to say the association members possessed the purest stock in the world and members of the association were bound to do well later on.

A YEAR LONGER

Mr. Hurndall said he agreed with the suggestion that the registration books should be kept open for a period beyond that set down in the Association rules. He would move "that the registration book be kept open for registration of goats till the end of December 1903." This was seconded by Mr. P. Hobson and carried.

NOTICES OF MOTION

The following notices of motion were handed in :—

By Mr. S. B. Hobson: "That the point slip be altered so as to read when judging rams—10 points for fineness and 15 points for weight."

By P. E. Hobson: "That the rule referring to registration be so amended that no goats be allowed to pass the third inspection before having their progeny, if any, shown as a guide to the Inspector."

By Mr. P. Hobson: "That in order to provide for a fixed salary for the Secretary, a charge be made on all goats inspected annually."

THE SECRETARYSHIP.

Mr. P. Hobson said that Mr. Lee had intimated his intention of resigning the Secretaryship, but he hoped that he would not carry that intention out. Mr. Lee was a most capable Secretary and had worked hard. They had no one else who was so capable of the work. He requested Mr. Lee to continue the Secretaryship.

Mr. Lee explained that the work entailed took up more time than he could devote to it, but he was prepared to continue for another year if some remuneration was made. He would then be able to get clerical assistance.

MEETING ADJOURNED.

Mr. R. F. Hurndall, seconded by Mr. R. C. Holmes, moved that the meeting be adjourned to December, the time of the Angora Ram Fair at Graaff-Reinet. Carried.—*G.R. Advertiser.*

CORRESPONDENCE.

THE PLAGUE OF TICKS.

Another Remedy.

Kaffrarian Practice.

To the Editor AGRICULTURAL JOURNAL.

SIR,—Our indebtedness to Mr. Lounsbury, the Government Entomologist, for his investigations into the problem of diseases amongst stock being spread by ticks, is acknowledged on all hands. Many of us believe in the possibility of completely eradicating ticks within a given area, if no transport oxen are allowed to pass through it without first being sprayed or dipped. One gentleman remarked that when our stock are kept free from ticks, more than half the diseases they now suffer from will disappear. It is acknowledged amongst sheep farmers that when scab existed in these districts, and sheep were regularly dipped twice after shearing, that there was less sickness than now. My object in writing to you is to show that there are other and more convenient materials for spraying than paraffine and water.

Up to the time of the outbreak of red-water in these districts very little attention had been paid to ticks on cattle. That disease was followed by a plague of small ticks that covered the skin of the beast and gave it the appearance of a coarse file, and was termed "isitwi" the Kaffir word for ticks. We all knew that lime and sulphur destroyed the ticks on our sheep, so this remedy was tried on the cattle. It was however soon found that it required too much rubbing in, and that the natives' hands were injured, so other dips were tried. The carbolic dips did not prove quite satisfactory, Coopers Dipping Powder then came into use, and we who use it have no fault to find with it.

Since the discovery that soap would kill young locusts, we have added soap to the dip and find it mellows and improves it in every way. The proportion we use is one pound of dipping powder, soaked for an hour, one bar of soap boiled, to ten gallons of water. This mixture can be used with any kind of spray pump, or with a bottle in one hand and a bit of sheep skin in the other. The only precaution necessary is to break the lumps in the powder by hand, and to keep the mixture well stirred when dipping out for use.

Some farmers prefer paraffine and soap, the soap being first boiled and the paraffine added as soon as cool and then churned till a thick emulsion is made. The receipt is, one bar of soap boiled in one gallon of water, add six bottles of paraffine and churn for twenty minutes. This mixture can be used with any kind of spray pump, or with bottle and bit of sheep skin.

When the grantees came into the Kaffrarian districts forty-two years ago the country was practically free from ticks. Previous to 1847, these districts had swarmed with cattle. The infatuation of the Gaikas and Gcalekas in that year cleared the country of cattle and all kinds of stock, and there was practically no game in the country. Transport oxen were the only possible hosts for ticks for nearly three years. We were told by old residents and the Kaffirs themselves, that the country was bad for ticks and gall-sickness. And that it was the practice of the Kaffirs to examine the cows udders at milking time every morning, and destroy ticks by passing a Kaffir needle through them.

We did not find the country bad for ticks or gall-sickness for some years. In my own case the only cattle I lost was from an outbreak of lung-sickness; but later both ticks and diseases amongst stock increased. The experience of those who have either sprayed or dressed for ticks for any length of time, goes to prove that ticks may be kept under if not altogether exterminated.

Kaffraria, November 12th, 1902.

I am etc.,

R. W.

THE ANGORA INDUSTRY.

Mr. Hoerle on Mr. Lee.

To the Editor, AGRICULTURAL JOURNAL.

Sir,—Through the courtesy of one of your subscribers, I have received a clip from your paper, entitled "Mr. Lee and Mr. Hoerle," containing rather startling statements, in regard to my doings in the Cape Colony, which to rectify, I hope you will not refuse me the space.

Owing to the very cordial reception, which was given me by Mr. Lee's son, Mr. C. G. Lee, I refrain from giving the answer which those insinuations deserve, but I cannot help to ask one pertinent question: What ails Mr. Lee? Is his mind upset, because, in stead of choosing head-quarters at "Leetown" I took up my abode at "Hobsonville?"—But let me proceed to facts!

Mr. Lee infers—for evidently he has no idea, of where I have been, nor what I have done, and this is a grave mistake on the part of a man who makes such charges on another's character,—that I

had been looking at the "Small Angora District," from the windows of a railway car, and it puzzles him how I could have collected any information, and procured stock from the representative flocks, in such circumstances.

Allow me to inform Mr. Lee, that before I had left America, I had collected sufficient information about your Angora district, to cause a Port Elizabeth Mohair buyer to tell me, that with the exception of a few more names, I was sufficiently well posted for my purpose. Still I made good use of my time in the Mohair warehouses, and also procured a copy of the report of the last Agricultural Show at Port Elizabeth. I spent December and January in the Colony, and under the circumstances we fast-living Americans would call a man dull and slow if he could not do, what I did in half the time.

In the above mentioned Show report I found that Mr. R. C. Holmes had taken nearly all the prizes for rams, whilst he only took one single V.H.C., for a yearling ewe. The other premiums were awarded as follows, Messrs. G. H. Maasdoorp and W. J. Edwards only took "first" for the best imported ram "Rhoadi" Mr. J. H. Featherstone taking "second" The others were for rams; John E. Hobson, one "first" and one "second," Gardner Bros., one "first" and one "second," J. Hobson & Son, one "first" and one "V.H.C." H. Barber, one "first" R. Cawood, Gilbert Biggs and C. J. Clark each one "second."

For Ewes: Jas. H. Biggs, two "firsts," J. E. Hobson, one "first," one "second" and one V.H.C.; S. B. Hobson & Bro., one "first," and one "second," H. J. Moolman jun., and E. J. De Wett each one "first," R. C. Cawood two "second," J. H. Featherstone one "second," R. C. Holmes one V.H.C.

By some mysterious oversight, the name of C. Lee sen., has been entirely omitted! Besides whenever either Mr. J. E. Hobson and Messrs. S. B. Hobson & Bro. got second, the award was made by the judges in such words as to leave no doubt, that there was practically no difference between the animals which had received the first and second premiums. That Mrs. W. C. Hobson was not among those who gained awards did not surprise me, as her son who had the management of her farm was away from home, and on that account could not exhibit that year.

My purchases were made from Messrs. J. Hobson & Son, their eleven best ram kids and thirty choice yearling ewes—from the ram kids they reserved only one for themselves. From Mr. John E. Hobson I bought four rams and twenty choice ewes. Of the rams Mr. Hobson wanted to keep one for himself and another was spoken for by Mr. R. Featherstone. From Mr. J. H. Biggs, I bought one four-toothed and one three-toothed ram; both had been used by himself, five yearlings and eleven kid rams, after he had reserved two for himself, and also thirty choice ewes. From Mr. Percy E. Hobson—formerly S. B. Hobson & Bro., I got seven rams and ten choice ewes, from Mr. W. C. Hobson and Mr. Arthur B. Hobson I selected twenty-five yearling rams and nine choice ewes, and from Messrs.

Cawood Bros., of Mt. Stewart, I selected five yearlings, their twelve best kids and thirty-six choice ewes, I had my pick without reserve, and they included the Gardner Bro., yearlings.

I leave it to your readers to judge, how far I came from selecting stock from the leading representative flocks of your country; but how Mr. Lee can justify the words which he puts into the mouth of Mr. Cawood: "that they quite came to the conclusion that he (meaning me) was not prepared to pay, what we ourselves often pay for a decent goat"—inferring that I had bought worthless scrubs, will be hard to explain.

In regard to my opinion about South Africa as a Mohair raising country, I have freely expressed my views to my Cape friends, but that Mr. Lee may see that I am not the only one who holds such views, I will quote from a letter, which Mr. S. B. Hollings of Bradford, one of the first English experts, has written to the *American Sheep-breeder* of Chicago.

"Now Cape goat-breeders are to-day reaping the penalty which disregard and disobedience always brings, for whereas we see to-day Cape flocks worth no more in Bradford than 12 to 12½ pence, Turkey average is worth 16 to 16½ pence and Turkey superior 19 to 20 pence," etc.; further, "honourable mention could be made of a good half-dozen names, whose flocks to-day are of the standard of Turkey, and whose mohair clip there is no difficulty of sale, etc.;" and again: "A Cape Colony goat-breeder sent me several of his samples of mohair with a request, that I measure the diameter of the fibre, and report on them. He prefaced his samples by saying, that he believed he had as good a little flock of Angoras, as could be found in the whole Colony, as he had bought most of them from a leading breeder. The man can be pardoned for his natural pride in his own stock, it being human nature to think that we have the best, but the machine for fibre measurement revealed the inferiority and lack of quality, which was manifest to any experienced eye."

Opinions may differ, but when it comes to an expert's judgment the latter is always measure giving. When I bought from Mr. A. B. Hobson, there were five classes of rams, the first costing five times as much as the fifth. When I returned to New York with the Mohair samples of all these rams, our Mohair expert Mr. Wm. R. Payne, picked out as the best one of the fifth class, the next was one of the second, then one of the third, and again one of the fifth, before he finally picked one of the first class. When I explained that on one ram's back the hair was too short, another threatened to breed fluffy, etc., he said, "that remains to be seen, but I would not breed a ewe of mine to any of these other fellows"—yet, Mr. Payne is no breeder.

Thanking you in advance for your cordial acceptance of this declaration, I remain, dear sir.

Yours very truly,

G. A. HOERLE.

Milland Park, N.J. September 29th, 1902.

THE CASTRATION OF ANIMALS.

To the Editor, AGRICULTURAL JOURNAL.

Sir,—A very simple and efficacious method of castrating males of any age is greatly practiced in Australia, with satisfactory results, stallions of eight years of age being castrated without risk by a novice. I refer to the "Ecraseur" an instrument invented by M. Chassaignac. It consists of a small metal tube, with a small sprocket chain passed through. The chain is looped round the cord and gradually crushes its way through by means of a screw arrangement at the end which is turned very slowly, until the chain has completely severed the ligament. The great advantage over the knife, is, that it causes little or no bleeding, the torn vessels contracting spontaneously. Of course the scrotum is opened in the usual way, the chain passed over the testicles and tightened on the cord very slowly. The operation is complete when the chain has passed through.

Yours &c.,

AUSTRALIAN.

The Colonial Veterinary Department does not recommend the use of the Ecraseur except by trained veterinarians, owing to the care necessary to keep the instrument perfectly clean. In the case of neglect there is always a danger of blood-poisoning.

QUERIES AND REPLIES.

A Faulty Saffron Pear.

A Carnarvon correspondent writes: "I have a sweet saffron pear tree about six years old. This tree would at first not blossom, latterly, however, it has done so. Every year it promises well but when the fruit is between two and three weeks old it acquires a yellow colour and begins to drop. Could you give the reason for this and suggest a remedy? Is there no other tree upon which walnuts can be grafted? What is the best way of grafting and when."

This pear is evidently not one of the self-fertilisers; hence unless there is some medium for fertilisation in the shape of other pear trees growing about to assist in the fertilisation the result is usually a barren tree. This could be remedied in the first place

by planting other varieties of pear to assist in the fertilisation. The best sort for this purpose is the variety known as Keiffer's Seedling which is largely used in the United States. To further assist the tree root pruning might be tried. This operation is carried out by cutting all the roots on two sides of the tree (of course avoiding the weather side) about three feet from the stem. This will be found to have the effect of setting the fruit which might otherwise drop in the bud even after having been fertilised. The grafting of walnut is not resorted to except on the walnut itself. Thus if a grower finds he has an extra good variety of the best bearing quality he sometimes finds it will pay him to work that on another walnut stock. Otherwise we know of no tree that is stronger than the walnut stock itself.

Spraying for Potato Disease.

A correspondent writing from Potchefstroom in the Transvaal says: "I see you give some particulars in your November number as to how best to spray for the Codlin Moth. Could you let me know what proportion of sulphate of iron or copper is used in England for spraying potatoes to prevent the potato disease, as I thought it might help for the rust which is so destructive some seasons here on potatoes."

It is to be feared that the "rust" which our correspondent mentions is the potato disease itself. Take 2 lbs. of copper-sulphate dissolved in a little boiling water. Add 2 lbs. quick lime (less will do it if it is good). Make up with cold water to 10 gallons—4 per cent. solution.

The "Best" Cream Separator.

A Richmond Correspondent writes asking which we consider the best cream separator for from 25 to 30 cows.

It is difficult to name the "best" separator right off. There are so many in the market and they all have points which commend them to users according to taste. In Cape Town eight different makes are sold and as it would be impossible to arrange them in order of merit, we place them alphabetically. They are: the Alexandra; Alpha-Laval; Crown; Eclipse; Melotte; Princess; Record (Crown); and Svea. Each make is represented in various sizes separating 10 to 100 gallons. They are obtainable from almost any of the Cape Town hardware merchants, viz., Messrs. R. M. Ross & Co., G. Findlay & Co., J. Robertson & Co., Woodhead. Plant

& Co., Spilhaus & Co., and Koch and Dixie. Hence, if our correspondent knows what quantity of milk she has to separate night and morning, a machine can be secured to suit. That the number of cows is scarcely an exact criterion every farmer knows very well. The quantity of milk is easily gauged as six bottles go to the gallon.

Ringworm in Calves.

A Britstown correspondent writes: "Can you give me a remedy for warts or ringworm in calves? We have generally close upon 100 calves and when about a month old sores begin to appear round the eyes and afterwards spread all over the body. The sores are of a hard scabby nature but dip does not seem to have the desired effect. If of ordinary strength it does not cure the warts and if too strong it causes the hair to fall off."

Mr. W. Robertson, M.R.C.V.S., of the Veterinary Department says this is undoubtedly ringworm and supplies the following drawn up by Mr. Hutcheon, C.V.S., and published some years ago.

Ringworm is a vegetable parasitic disease of the skin. There are two varieties one called *Tinea tonsurans*, or common ringworm characterised by circular patches denuded of hair and covered over by white scabs or crusts extending in a circular manner. The other is called *Favus* or honey-combed ringworm. This is common to cattle in this Colony. Both varieties are contagious.

Treatment:—Similar in both varieties and consists in destruction of vegetable parasite. This is very effectually accomplished by iodine and mercury preparations, such as iodine ointment; strong tincture of iodine; a solution of corrosive sublimate, one drachm to two fluid ounces of water, applied carefully to the affected spots only. An excellent remedy is

Biniiodide of Mercury	...	...	1 drachm
Prepared lard	...	...	4 ounces

mix and make into an ointment. Scrape off the scabs or crusts carefully with a knife, or clean them with soap and hot water applied with a hard brush. Afterwards rub in a little of the ointment, one or two applications are generally sufficient. Sulphate of copper ointment, made of one drachm of the copper salt to an ounce of lard. Tar acts fairly well after cleaning the scabs off and the juice of the euphorbia tree is also used, but must be applied carefully not to destroy the skin.

Rainfall and Irrigation

To the Editor, AGRICULTURAL JOURNAL.

Will you kindly inform me:—

I. Given a fall of one inch of rain in say, 11 hours' time, over an area of one square mile of our Karoo brak soil, how many cubic feet of water, or what percentage, would flow away?

II. How many cubic feet of water would be required to irrigate one morgen of lucerne through one season? How many loadings would it require, and how many crops will it yield?

Yours Truly,

J.V.

Beaufort West.

Our Correspondent pays us a high compliment in submitting his first problem, for it is next to impossible to give even an approximately correct answer. To give the information required, exact data would have to be forthcoming, which could only be obtained by accurate observations which in themselves would provide the answer. Everything depends upon the position and nature of the land on which the rain falls. But presuming that our correspondent is seriously seeking knowledge, we have with the assistance of the Meteorological Department, collated a few facts which may help him and others similarly placed.

The point of the first question is to find out how much water would flow away, and presumably, the quantity which might reasonably be expected to be retained in a dam. From the latest returns we see that the only rainfall that would be available for such purposes in the Beaufort West District is that of March and December. In 1900 these were 1.00 in. and 3.47 in. respectively. On dry lands the whole of light rains are practically absorbed and evaporated, while heavy rains may flow away hardly soaking into the land at all. Hence the difficulty of giving anything like an accurate estimate. But for the sake of a calculation we may take the rains of March 1902 at Beaufort West. These fell heavily on two occasions at intervals of a few days and it may be fairly assumed that of the total of 2.8 inches, 1.25 inches (or 2,904,000 cubic ft. per sq. mile) would flow off. About 1 inch (or 2,328,200 cubic ft. per sq. mile) would be lost by evaporation while the remainder (1,272,200 cubic ft per sq. mile) might be absorbed by the soil. If this rain fell without a break within a short period of time far more would flow away than if it were more evenly distributed in which case the greater portion might sink in as it fell. And finally if it were spread over a number of days each with quite light rains and dry winds in between a greater evaporation would ensue while even more would flow off the dry baked surface than could enter the soil. It may be of use to our correspondent to know that

- (1) An inch of rainfall equals 3,630 cubic feet or 22,635 gals. per acre.
- (2) The evaporation might be taken as 35 per cent. of a one inch rainfall on flat land but double this on undulating or rocky country.
- (3) The percolation varies enormously. No investigations on this interesting point have as yet been undertaken in Cape Colony, so we have no data to guide us, but on cultivated land it might be 33 to 50 per cent. of a heavy rainfall. The average percolation in England is 42 per cent.

The second question dealing with Lucerne is also a difficult one to tackle, as the amount of water needed for this crop depends entirely on soil, situation, climate and climatic variations, &c. It is therefore manifestly impossible to supply a precise answer. In some districts four leadings suffice. Elsewhere the water is led monthly or oftener as required. Experience alone, coupled with careful observation, supplies the correct formula. As to "crops," or more correctly speaking cuttings, these may be made whenever the lucerne is tall enough to cut. It is in the most nutritious condition from the time flowering commences until it is in full bloom. According to the quality of the soil, cultivation given and water supplied the yield may be 12 to 15 up to 33 and even 60 tons of green forage per acre per annum.

A Scheme for Manurial Experiments

The following is the answer posted to a correspondent who wrote asking advice as to manurial experiments:—

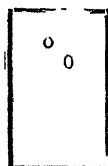
I understand your correspondent wants to form an idea as to what artificial fertilizers will give him the best results and what quantity to apply to his land.

A chemical analysis of his soil and details of its physical character would be useful guides to him in such work.

A series of trial plots, will, however, give him much more direct practical information. It is necessary to bear in mind that any results he may arrive at may only hold true of the particular bit of land on which they are carried out, thus what is right on one hill-side may be very wrong on another or an adjoining vley; at the same time local knowledge and common sense will easily guide him as to how far results obtained may be applied to his and neighbouring farms.

In manuring we have to consider three essential plant foods, phosphoric acid, potash and nitrogen. Hence it is desirable to try manures containing each of these alone, then to combine them in different ways and compare them all with plots (1) given nothing at

all, and (2) dressed with stable or kraal manure. Such plots may with advantage be multiplied so that different manufacturers' fertilisers may be compared and different quantities of each tried. This complicates matters, hence I would suggest that your correspondent try something simple like this to begin with. Let him take a piece of land of even quality throughout and treated in every way uniformly. Let him divide this up into 9 plots of $\frac{1}{20}$, $\frac{1}{10}$, or $\frac{1}{4}$ acres according to the area available, each plot being separated by a path



P	1	N	5
PN	2	NK	6
PNK	3	PK	7
D	4	K	8

about a foot wide, and let the corners of each be carefully marked by stakes, and each plot numbered. In the accompanying figure I have arranged these plots in a certain order to facilitate working. When the land is being prepared for the crop, the phosphatic manures—be they superphosphates, Thomas' Phosphates (basic slag) or bones,—are sown on four plots indicated

by the letter P. Nos. 1, 2, 3 and 7. Similarly whichever nitrogenous manure, nitrate of soda or sulphate of ammonia, is selected, it is sown on plots Nos. 2, 3, 5 and 6, and potash is applied to 3, 6, 7 and 8. Finally D may be given stable manure, and a plot No. O is measured off from the field and either given no manure at all or treated according to the usual practice of the district for comparison.

A second series of plots with the same arrangement but double doses is certainly to be recommended.

Such series may be indefinitely multiplied by trying different fertilisers in varying proportions. In subsequent years still more may be learnt. For instance, say that in the first year single doses of potash and nitrogen give the best results but double the normal application of superphosphates, and that the results where combinations are used tend to confirm this, then next season we may try a dressing in the proportion indicated compared with the normal dressing or the double dressings.

This leads to great economy in the purchase of artificial manures, and no doubt, if properly conducted, will pay handsomely.

In this way the rival merits of "supers" and "slag"; of Kainit, sulphate or muriate of potash, etc., may be tested.

In fixing on the quantities to be used it is always necessary to know what amount of the desired plant food is present in your manure, thus, while 100 lbs. of commercial "muriate of potash" ought to contain 50.5 lbs. of potash, 100 lbs. of Kainit contains only 12.4 lbs. of potash, so that it would manifestly be necessary to use four times as much of the latter in order to give the same amount of the desired plant food to the crop. Manufacturers are usually prepared to furnish such analyses with their fertilisers, and farmers should insist on getting them and being guided by them.

Judging by results observed by Mr. Mason of the Government School of Agriculture, Elsenburg, after careful enquiry, the following seem suitable dressings per acre to start with as normals:—

Superphosphates (P)	...	...	200 lbs.
Basic Slag (P)	...	...	200 „
Sulphate of Ammonia (N)	...	...	70
Nitrate of Soda (N)	...	...	75
Muriate of Potash (K)	...	...	50
Sulphate of Potash (K)	...	...	60
Kainit (K)	...	...	200
Kraal Ash (K)	...	...	200
Government Guano (P.K.N.)	...	...	200

Trials on the same lines may be made with Government Guano and certain manufactured fertilisers containing all the three plant foods in various proportions, as also does dung, while the application of lime in a similar way opens up a wide field of enquiry.

While there is no limit to the number and complexity of possible experiments let me warn your correspondent at the outset against undertaking too complicated investigations at first. A few simple facts, such as whether potash is needed at all or not or whether basic slag or superphosphates answer better on his farm, will be worth far more than an elaborate but inaccurate accumulation of theories.

If at any time I can be of use to him in furnishing further details, I shall be happy to hear from your correspondent.

ERIC A. NOBBS.

So-called Measles in Pork.

To the Editor, AGRICULTURAL JOURNAL.

Sir,—As I have not been a regular reader of your paper, I do not know if you have discussed the disease of measles in pigs.

This disease is very prevalent in this country, and I have often seen fine pigs over 400 lbs. infested with it.

Is there any cure and could you send me any information about this disease and its cure?

It ruins the pig trade, and the larger the pigs the more sure are they to have it.

Please send me any information you can.

Yours, etc.,

C. J. ROBERTS.

King William's Town, November 18th 1902.

The disease commonly called "Measles in pork" has been fully discussed in the pages of the *Agricultural Journal*. The innumer-

able little white specks in the flesh which give rise to the impression that the pig has measles are in reality the cysts of the human tape-worm, *Tænia Solium*. This "Measly Pork," is, we regret to say, very common in this Colony. The pigs roam at large, and in the absence of sanitary provision in the country districts, they play the part of scavenger-general and consume among other filth, human excreta which frequently contains large quantities of the eggs of the tape-worm. The embryos which escape from the eggs are furnished with a boring apparatus which enables them to bore their way to the muscular tissue of the pig's body, where they become encysted. A human being swallowing these cysts raw or improperly cooked, becomes infested with tape-worms. Mr. Hutcheon, C.V.S., has stated that he knows of no reliable means of discovering whether a pig is affected with "measles" during life, neither is he aware of any medicinal agent that will destroy the cysts. The only reliable cure is to remove the pigs to a clean sty and keep them away from all sources of infection for five or six months. At the end of this time the cysts will have died and undergone the natural progress of degeneration, when the flesh of the infected animal may be eaten with impunity.

Liver Disease In Fowls.

To the Editor, AGRICULTURAL JOURNAL.

Sir,—We have been losing our fowls very badly lately, as many as three or four being found dead in the morning. The day before they show no signs of sickness but on being opened show a very enlarged liver. We have dosed them with castor oil, and Epsom salts mixed in bran. I shall be very much obliged if you can suggest a remedy in this case.

Yours, &c.,

W. A. MORTON.

Caledon, November 4.

The disease that is working havoc amongst your fowls is undoubtedly Liver Disease. The general causes of the complaint are bad feeding, or the giving of a food that is too stimulating, but the chief cause is overcrowding and consequent tainting of ground. The food given to the birds should be reduced in quantity and quality avoiding everything of a rich or fatty nature. The best things to feed are hard cereals, whole wheat or barley, but mealies should be avoided. It is advisable to give as an aperient medicine—2 grains of Calomel per day with $\frac{1}{2}$ oz. of Epsom Salts every alternate day, per bird, for a week.

JAMES WOODIN.

COUNTRY REPORTS.

Made up to November 15, 1902.

Crops and Stock.

Condition and Prospects.

Aliwal North.—The season so far is particularly satisfactory. The rainfall for September was 2·77 inches and 1·76 inches for October. The condition of the veld is excellent and sheep and cattle doing remarkably well. The lambing season has been a particularly good one. Scab is infecting a few flocks in some localities. Slaughter stock very scarce and high in price. Horses are still in demand and realise from £25 to £40. Mange is very prevalent. Cereals generally look promising, but more rain is necessary for the crops. Not much wheat has been sown owing to the scarcity of cattle in the ploughing season. In some localities wheat has been badly affected by late frosts. Peaches, apples, pears and apricots very promising. No disease so far. The weather has been warm in the daytime but cold at night.

Albany.—Light rains have fallen in some Wards of this district but it is very dry along the Fish River. In fact the Fish River is a dry sand bed for miles and seems to be filling up more every year. The prevailing conditions are very windy and very dry. Oats are doing fairly well and some good crops are expected. Mealies are sown heavily on some farms but want rain badly. Barley is a good crop and lucerne is doing well where cultivated. The fruit varies. In some cases it promises well. In others the hot winds have damaged it considerably. In others again black and yellow scale and grubs are troublesome. Cattle are doing well with the exception of a few cases of sponziekte, and a good calving season is reported. Dairying is prospering and two creameries supported. Horses and mules are in good condition but scarce and dear. Small stock are doing well, the lambing being very favourable. Ostriches generally speaking, are not doing so well this season, being troubled with wire-worm and the pluckings very much damaged. Pigs are not common in this district; those we have do very well.

Albert.—Hot and windy weather prevails and rain is wanted very badly. The veld looks wretched. Very little wheat sown, promises well. Oats are good, better than last year. Early seed mealies scarce; lucerne is spreading and doing well. Fruit does not promise very much. Cattle are doing fairly well, there is little or no disease. Horses are suffering from the drought. Mules and donkeys unobtainable. Market falling. Sheep are in very poor condition. Scab is prevalent though flocks are being cleaned. Angoras and ostriches are doing well.

Alexandria.—With a continuation of the rains the country looks very well indeed, the veld keeping in good condition. All crops look well, oats being particularly fine. Young mealies are looking well and barley is good. Scale and collar-rot are troubling the orange growers. All stock are doing fairly well, particularly cattle and horses. The sheep and goats of this district are a mixed lot and they thrive. So do the ostriches.

Bathurst.—The rainfall from June to September was very heavy, and the veld is keeping in good condition but we could do with some more rain now. Heavy crops of oats are anticipated, and mealies are being largely sown. Fruit prospects very good. Pines, oranges, apples, peaches, plums and apricots. Codlin moth and scale on citrus trees troublesome. Pineapples doing very well. Over a million plants put out this season. This is not a stock district but what we have seem to be doing fairly well.

Britstown.—The rainfall, though uneven, is a fair average this season and the veld is good for the time of year. Crops generally are poor this season, very little having been sown. Lucerne is doing well in small plots. Fruit and vines promise fairly well. Cattle in excellent condition but not plentiful in the district. Horses, mules &c., scarce and improving in condition. Sheep are doing fairly well and there is less scab. The wool is very promising. Ostriches are doing fairly well but some farmers are complaining. Good pluckings are anticipated. Pigs are flourishing where they are kept.

Bedford.—The season was very dry until the 13th of this month (November) when 1.50 inches fell, freshening up the veld and the crops. The farmer was very poor before that. Cold days and nights have ruled for some time. Cereals have suffered from the drought, especially wheat, the rain coming too late to prevent much of this from being burnt up. Oats are a large crop with a trifle of rust, though crops failed in some wards. The late rains will enable farmers to plant mealies. Lucerne showed a good crop but suffered

considerably from the drought. Very little fruit is grown in this district. With the exception of a few cases of gall-sickness and sponsziekte, cattle are doing fairly well. The calving season was a bit late but those calves dropped are all healthy and doing well. Dairying is attracting more attention of late. Horses are doing well, but are dear and mange is still prevalent. Imported mares here, probably because the season is wrong for them, do not appear to get "set," whereas Colonials do not trouble the stallion more than usual. Sheep are doing well. The wool is light and fairly free of scab. Lambing specially good on some farms. Slaughter animals command record prices. Persians are in demand. Angoras doing well. Kidding just over and very successful. Scab is mentioned but have heard of no losses after winter shearing just over. There is a scarcity of ostrich chicks, as jackals are destroying nearly all veld nests.

Barkly West.—Locusts are absent but the pasture is very dry and rain badly wanted. Wheat and oats damaged by frost, also potatoes. Late frosts damaged the fruit. Cattle are scarce but doing fairly well. Horses, mules and donkeys scarce, and in poor condition. Sheep are in fair condition and in demand, also Cape Goats.

Calvinia.—Fairly dry since October, veld fairly good. Crops very poor this season. Fruit comprising plums, peaches, apples and quinces doing well. Cattle are doing fairly well. Horses, mules and donkeys in poor condition. Sheep, goats and ostriches all doing well.

Caledon.—A very heavy rainfall has been followed by strong winds doing much damage to fruit trees and crops. The veld is excellent for this time of the year, for, as a rule it is very dry. All crops are looking well. Wheat is most promising while oats are the best crop known in the district for years. Fruit has been damaged by wind, but the vines are doing well. Most of the vines in this district are grafted. Cattle are doing well with the exception of a few cases of krampziekte. Horses are scarce but in poor condition though mules are plentiful. Merino sheep in good condition; wool very promising and very little scab. Pigs are thriving.

Oathcart.—Rain having again fallen, the veld is keeping in first class condition. Oats are still doing well, but the mealies are poor, particularly in Ward No. 1. Another frost early this month again nipped the fruit which is now far from promising. Cattle are improving and seem fairly healthy and free of disease. Horses are more plentiful and their condition is improving. The wool clip is now coming in, and is commanding good prices. All slaughter stock are in good condition.

Craddock.—With an exceptionally dry season—no rain since September—the veld looks very bad for the time of the year, and there is great want of water in many parts of the district. Fortunately there are no locusts as yet. Very little wheat or oats were sown this season and mealies are doing very badly. Lucerne, where it has been cultivated has proved a valuable stand-by during the drought. It is growing in favour. Fruit is promising but the drought has affected it adversely. Stock of all kinds is not doing well, but commands high prices in consequence of the demand from the new Colonies. Sheep are not thriving, and scab is prevalent but the wool is fairly good. The Angoras are also suffering, as also are the ostriches. The pluckings generally are not so promising as last year.

Colesberg.—This season is rather below the average for rain, and it is cold for the time of year with slight frosts, but the veld is very fair, the Karoo bushes being in full foliage. Not much wheat was sown, but there is no rust and the crop is promising. Good crops of oats are expected. Lucerne is very plentiful and more is being sown each year. The frost caught some of it. Fruit not doing so well this year. Cattle are in fair condition and the calving season is promising. Very little dairying in the district as yet, and no creameries. Horses and mules in fair condition though mange is common. Good animals are still scarce. Sheep, principally merinos, are doing well, and the lambing season was good. Angoras are also prospering, the kids doing very well indeed. Slaughter stock scarce so many having been sent north. Ostriches are in fair condition, chicks just coming out. Jackals are troublesome and have destroyed a large number of nests.

East London.—Much needed rains which were preceded by tremendous, high winds quite cold for the time of year fell on the 13th of this month (November). More rain is needed for all growing crops. There is plenty of grass which has now improved. Wheat was not sown much this season, but oats show a good crop. It is too early yet to say much about mealies, as the weather has been so dry. Same applies to Kafir corn. Some patches of barley yielded well, and lucerne has been sown in small plots and cut green. Apples, peaches, Japanese plums, pines, oranges and bananas show a fair prospect so far. Scale and Australian bug and woolly aphis are on the apples. Cattle are doing well. Rinderpest and sponziekte are dying out, and there are only a few cases of gall-sickness. Slaughter stock scarce and dear. Good horses scarce and dear, but doing well. Mules sell well from £20 to £30 each, one pair of fine greys realising as much as £120 the pair. The few sheep and Cape goats in the district are doing fairly well. Pigs are scarce and dear. There is a good demand up-country for good pure bred pedigree Berkshires.

Fort Beaufort.—It was very dry in the lower districts until about the middle of the month (November) when light rains fell which freshened up the veld and crops. Wheat is doing well and a very heavy crops of oats is anticipated. Lucerne is not common in the district, though what little there is looks excellent. Fruit and vines promise well. Oranges are suffering from scale, and moths are prevalent. In the higher districts the late frosts did some damage. The general condition of the cattle is good, and we had a successful calving season. The only disease reported is an outbreak of spens-ziekte on the Winterberg. Horses are in good condition though mange is prevalent in one district. All riding and draught animals command very high prices. Horses £35 to £60, mules about £30. Sheep are doing well, the wool clip now coming in being in good condition. Scab is not very prevalent this season. Angoras are doing well and a heavy clip is anticipated. Ostriches are also flourishing, tapeworm being absent this season and the pluckings very promising. Pigs are scarce in the district.

Fraserburg.—The drought is being severely felt all over the district. It is in fact the driest season known for many years. Hot and cold winds alternate and the weather is most unseasonable. The veld is not very good and all crops are backward in consequence of weather conditions. Wheat and oats very little sown. Mealies just planting. Lucerne is doing well and good crops are expected. Wind and frost have damaged the fruit somewhat, but, if the season remains favourable, good crops of peaches, apples, pears, figs, apricots, plums, quinces, and pomegranates are expected. All stock are doing well in spite of the drought. Scab is scarce as yet and the wool clip promises well.

Gordonia.—The drought continues. Locusts have disappeared and the veld is poor. Very few cereal crops. Fruit is below the average. Stock of all kinds are feeling the effects of the prolonged drought. Cape sheep and goats are doing fairly well.

George.—The season has been very wet in this district, except in Outeniqualand, where the rainfall was comparatively light. The veld, consequently, is more in condition, the descriptions ranging from "very good" to a "excellent" and "beautiful." Wheat and oats are looking very well though less was sown than usual and there is a good deal of rust about. Where lucerne is planted it looks very well. Fruit and vines are also doing well. Cattle are doing well with every promise of a good calving season, but very little dairying is followed in the district. Slaughter Stock is scarce and commands high prices. Horses are in good condition but far from plentiful while generally speaking mules and donkeys are scarce. Riding and draught horses are quoted at £25 to £35, mules £25, and donkeys £15, sheep, goats and ostriches are doing well and pigs are thriving.

Glen Grey.—A few light showers have fallen since my last but more is required, otherwise the coming season will be worse than the last, which was not particularly good. The weather generally rules dry and hot, and cattle have to be removed to the mountains for pasture as the flats are denuded of long grass. Mealies are now being sown, other crops are unimportant. There is not much fruit but it promises well and is free of disease. Cattle are in fair condition with a few cases of lungsickness and of rinderpest. Horses are doing well and bring good prices. Sheep are in good condition but the wool now coming in is poor and faulty, a good trade is done in pigs in this district.

Hopetown.—We have had very little rain recently but the veld is excellent for the time of year. No locusts. Very few cereals grown and fruit is scarce. Cattle are doing fairly well. Horses very poor and scarce, mules the same. Sheep are doing well with little scab; wool promising. Ostriches are flourishing, pluckings promise well. Pigs scarce.

Hanover.—The light rains this season constitute about an average fall but they seem to do more towards making the veld grow which looks fairly well for the time of year. Locusts seem to have disappeared altogether. Wheat promises exceptionally well reaping coming on next month (December). Oats a splendid crop minus rust. Lucerne and other crops all doing well. Cattle are healthy and thriving. Horses scarce and command high prices. Merino sheep are in good condition and commanding high prices thousands being bought up for the O.R.C. and Transvaal. Goats are not plentiful but the few we have are doing well both Cape and Angora. Ostriches are thriving but the nesting was late this year in consequence of the late rains. The pluckings are not so promising.

Hay.—Rainy season only commencing. Veld very good for time of year. Crops of all kinds are poor. Cattle are doing well with the exception of a little lung-sickness. Horses, mules, &c, doing well but still dear. Sheep are doing well, with very little scab, there are some good Angoras which are thriving, but scab is more prevalent among goats.

Herbert.—With a good rainfall and a fair season, the condition of the veld is good. Crops practically nil with the exception of lucerne which is doing very well here. Fruit is promising this year. Cattle are doing well though there are a few cases of lamziekte. Slaughter beasts realise good prices. Horses are in good condition but scarce, as also are mules. Donkeys, however are plentiful. Market firm for all draught animals. Sheep are in fair condition and improving. The wool is all good as there is a marked absence of scab. Angoras and Cape goats are doing well; ostriches very fair; pigs, few, but thriving.

Jansenville.—Heavy rains about the middle of the month (November) came in good time for they were badly needed as we had none since September. The veld was fairly good and should now improve. Cereals with the exception of oats, a good crop promising, are not planted much. All farmers with water for irrigation are yearly increasing their lucerne plots. Fruit is doing fairly well with the exception of oranges which are attacked by red scale. Cattle are healthy and in good condition with a satisfactory calving season. Horses satisfactory, ruling from £20. Donkeys £12. Sheep in fair condition with a good lambing season. Angoras in fair condition. The kidding season which is just over was good. Ostriches are doing very well this season.

King William's Town.—The season promised well but drought set in and no rain fell for about two months until the 13th inst., (November) when a heavy thunderstorm broke over the district. Previous to that the veld was very dry indeed. Heavy crops of both wheat and oats are expected, though the drought kept them back. Large quantities of oat-hay now being reaped, but rather short. Mealies were kept back for the same reason, and little planting was done. Those already sown are not looking well. Kafir corn has been sown but, without rains, will fail. Barley is a good crop this season. All stock are doing well. Cattle, with the exception of a few cases of lung sickness, and horses with the exception of a little biliary fever. Good draught horses are still scarce. Sheep are in excellent condition considering the drought. Shearing is just finished and the wool is very good, meeting a firm market at from 7½d. to 7¾d. per lb. for six months' clip. Slaughter hamels not equal to demand at from 26s. to 28s. each. The natives raise a large number of pigs, mostly of the common native breed, which are doing very well.

Knysna.—Very wet season so far and weather still threatening. Wheat showing signs of rust. Oats a very heavy crop. Fruit promising. Vines exceptionally good—all Cape stocks. Stock all doing fairly particularly young calves. Horses greatly improved since last month. Ostriches not doing so well in some wards.

Mafeking.—The season is exceedingly dry, in fact the worst remembered for twenty years. Heavy north-westerly winds prevail, and the veld is so bad that it could not possibly be much worse. All cultivation is at a standstill, farmers waiting for rain all over the district. Every description of stock is suffering from the drought, and the calving season promises very badly indeed. Slaughter stock scarcely exists, the military having requisitioned everything. Horse sickness prohibits the breeding of horses. Very few sheep or goats are left now, most of them being accounted for in the concentration camps. Pigs are scarce.

Malmesbury.—Since the last report from this district the weather has remained fairly favourable, and the cereal crops, which are mostly about ripe and fit to reap, promise well. Rust has shown up a good deal in both wheat and oats in some parts of the district, but not sufficient to damage the crop materially. Some exceptionally fine crops of Algerian oats, entirely free of rust, are nearly fit to cut. The condition of the veld is excellent for the time of year. The uplands are drying off a little but low-lying veld is still very fine. Pears and oranges promise well, but peaches seem affected by a kind of blight, many apricot and peach trees having died during the winter. Old vineyards are dying off fast, and are being replaced by American grafts which have not commenced bearing yet. Cattle are doing well and there is little or no disease, the calving season being successful as a whole. The creamery has made its record quantity of butter (17,000 lbs). This besides private dairying. Horses are in good condition but scarce and dear; foals are few in number. Merino sheep are in fair condition, but the lambs are poor. Liver and stomach affections seem common among all sheep just now. The wool is a fair clip averaging for well-grown 8d. per lb. Cape goats and pigs are thriving.

Mossel Bay.—The rainfall this month (November) is light so far but the season is better than the last. The weather has been hot and the veld though in fairly good condition is beginning to get dry. Cereals generally are looking very well, though rust has made its appearance in some instances. Generally speaking good crops may be expected. Wheat is doing fairly well but oats are cropped heavier, and are showing up excellently, especially the Egyptian oats which are free of rust. Mealies are not sown much as yet. Lucerne is gradually coming into favour and in some of the wards looks well. Fruit is not so promising owing to the depredations of fruit-eating birds. The Australian bug is reported on the Great Brak River. Stock, generally, are doing fairly well this season. Cattle are in fair condition with little or no sickness. Dairying is backward and little done in the district. Slaughter stock is scarce and dear. Horses and mules and donkeys are also scarce, and fetch high prices, horses ranging from £30 to £40. Sheep are doing well and a good clip of wool is being realised. Cape goats do well here but their condition is not good just now. Ostriches are prospering fairly well. Tapeworm is prevalent among the young birds but not as bad as in some years. The pluckings are promising. Pigs do very well.

Middelburg.—This district is very dry and rain is much needed. The condition of the veld is very fair for the time of the year. As a rule it is good at this season. We had rains earlier than usual but the prevailing cold winds and late frosts counteracted the good effects. There are no locusts. Wheat is not so heavy a crop as

usual but it is looking well. Oats are a heavier crop than usual and are coming on splendidly. Lucerne is plentiful and in good condition. Fruit is a failure owing to the frosts. Stock generally is doing well. Cattle are free of disease and dairying is progressing. Horses are in fair condition though farcy is reported in one ward. High prices are still maintained. Sheep very fair, but the wool is below the average, scab being prevalent. Lambing season excellent. Angoras all doing well, kidding very favourable. Ostriches are doing well but chicks are scarce as the baboons are destroying the nests.

Murraysburg.—Very dry, very windy, and as a consequence a poor season. Wheat promises well, but oats were little sown this year. There were heavy sowings of mealies but the worm got into the crops. Fruit promising. All stock is suffering in consequence of the drought, though slaughter animals command high prices. There is very little scab in the district. Angoras and ostriches doing well indeed. Pigs are thriving in some parts of the district.

Namaqualand.—With an average rainfall the veld is very good. As a rule the veld is drying up at this time of the year (November) but late rains have fallen here and the pasturage is fair. Very little wheat has been sown but it promises well. Oats are a fair crop, and other grains look well. Cattle are doing fairly well with an average calving season. Slaughter stock is scarce and dear. Horses and mules in good condition but scarce. Cape sheep do well, and scab is not so prevalent as it has been. Cape goats also doing well.

Oudtshoorn.—A very heavy rainfall, in fact far above the average, has been succeeded by very windy and unpleasant weather. The condition of the veld is excellent and the cereal crops are doing well. Wheat is well forward though rust is reported in one case. Oats though a smaller crop than usual promise well, while the heavy sowings of mealies are expected to give a very big return. Lucerne, which is largely cultivated in this district, is in full growth now and yielding heavy croppings. Very little is being done, however, to eradicate the pest of dodder. Fruit promises well, including peaches, plums, apples, apricots and oranges. Red scale is prevalent in citrus trees. Vines are doing well also. Stock all round are flourishing. Cattle are doing well with a good calving season but scarcely any dairying or cheese-making is carried on. Horses, mules, and donkeys scarce and dear, but healthy for time of year. Sheep (mostly the Cape variety) do well, also Cape goats. The ostriches are all doing well. The young birds of this season's hatching are prospering and free from disease, but pluckings not so promising as last season. Pigs do splendidly in the lucerne camps.

Paarl.—The wettest season known for years and the veld is excellent. But it remains too cloudy and rainy for this season of the year to suit this district. Cereals look fairly well but fruit and vines are not so promising. Fruit particularly is backward, although some kinds are better than last year. Red scale and American blight are troublesome. If nothing intervenes a medium vine crop may be expected. Most of the vines in these districts are grafted on American stocks. This is not a stock district but the few we have do fairly well.

Prieska.—The rainfall has varied in this district from a high average to scarcely any at all in other parts. The condition of the veld is therefore in some places quite dry, in others fair and in others very good since the recent rains. Crops, with the exception of oats and a little lucerne are practically nil this season. Cattle are very healthy and doing well. Mange is prevalent among the horses which are scarce and dear. Sheep are poor and scabby and the lambing prospects are bad. The wool clip is, however, fair. Cape goats are doing well as also are the ostriches.

Prieska.—Very little rain and veld very dry. Crops with the exception of oats, very poor. Stock of all kinds doing fairly except sheep which are very poor in some wards. The wool is good. Lambing prospects far from satisfactory. Scab very prevalent.

Prince Albert—The season is fairly up to the average, and the veld generally is in good condition. We could do with more rain as water is getting scarce in some wards. Wheat is not a heavy crop but looks well. Oats more plentifully sown and quite up to the average. Mealies are not yet planted. Lucerne is growing in favour and becoming more plentiful. Cattle and horses are in fair condition for the season, the latter commanding high prices. Sheep are doing well generally speaking with the exception of those infected with scab. The wool clip is promising. Cape Goats do very well here.

Queenstown.—Weather very dry from September till 12th inst. (November) when good rains fell continuing into the 13th. The veld is dry but should soon recover. Of cereals oats is by far the best crop, but nothing like last year's. Lucerne is doing well, and fruit promises fairly. Cattle are in excellent condition and good calving season anticipated. Dairying is "catching on." Horses good, but mange caused heavy losses. Sheep and Angoras doing exceptionally well. Lambing season just over and exceptionally favourable.

Richmond.—The weather remains very dry, in fact it is the driest season known for years. Very little rain has fallen for months. The veld is poor but improving a little in places. Locusts are absent

as yet. Wheat and oats are doing well, and with heavy sowings of mealies good crops are expected. Frost has damaged the fruit. Neither cattle nor horses are doing well, the latter fetching very high prices. Scab is prevalent, and the sheep are not in good condition. Goats, on the other hand, are doing well, there are not many ostriches in the district but they are doing fairly well. Pigs are thriving.

Robertson.—Season still inclined to be wet, and the veld generally looks excellent. Cereals not doing so well. Wheat very badly rusted in most of the wards and partly destroyed. Oats are a better crop. Lucerne is growing in favour and doing well. Fruit promises a big yield, principally peaches, apples, pears, grapes, and figs. Woolly aphis is troubling the apples. Vines look very healthy and promising for an abundant vintage. Phylloxera has, unfortunately, been discovered at Wonderfontein. Cattle and stock generally thriving.

Riversdale.—After a heavy rainfall the weather is very changeable. The veld is in good condition. Wheat is a good crop but badly rusted in places and the farmers are very anxious to obtain rust-resisting seed. Oats are doing well. Lucerne does well but very little is cultivated. Fruit promises well, scale is troubling the oranges. Stock generally are thriving. Cattle are doing well and dairying is gradually coming into favour. Slaughter animals scarce. Horses and mules generally are in good condition, but scarce and dear. Sheep are thriving, the lambing season being about the average. Goats not doing so well as last year. Ostrich breeding is improving, farmers taking more interest in their birds. Pigs are thriving.

Steynsburg.—The rainfall this season is rather better than last year, and the weather is now fine with the veld in excellent condition for the time of the year. Locusts have not as yet made an appearance. Cattle are doing fairly well, and slaughter stock are realising high prices. Horses are in fair condition but not over plentiful, a decent saddle horse commanding £25. The sheep are doing very well this season and the prospects of the wool clip are highly promising. Slaughter lambs realise about 25s. each. Angoras are also doing well. Crops of all kinds look very well.

Swellendam.—Excellent rainfall, veld in good condition all round. Cereals doing well though rust is showing in wheat. Oats not so heavy a crop as last year. Lucerne not plentiful but doing well. Fruit is promising so are the vines, all Cape stocks. Cattle, horses and mules are all doing well. Donkeys scarce. Sheep and goats, not largely bred in this district. Ostriches are in fair condition with no disease worth mentioning. Pluckings promise well.

Somerset East.—Light rains and strong winds rule. The veld is dry, and water becoming scarce in many places. Cereals not doing so well this season. Fruit is promising. Cattle are doing well, with the promise of a good calving season. Horses and mules doing well, but scarce. Sheep (merinos) doing well; fairly good lambing. Angoras also thriving, the kids coming on very well.

Stockenstroom —The season has been very dry till the middle of this month (November) when Upper Cathcart Vale was visited by a hail storm and four hours rain but this was not general. The veld is dry generally but may be expected to improve with the threatened rains. This will enable ploughing to be resumed. The main crop is oats which promise very well and a heavy yield. Mealies are being sown largely in some districts. Late frosts touched the fruit which is doing fairly well otherwise. Cattle are doing fairly well, so are horses and mules. Merinos are not doing so well, but Persians and crossbreds are in excellent condition. Cape Goats do better here than Angoras. Worms are playing havoc with the ostrich chicks, adult birds doing well.

Tarka.—Very dry till the 13th inst. (November) when nice showers fell. Veld is improving. Cereal prospects expected to improve with rain. Lucerne still looks well. Fruit mostly destroyed by frost. Cattle are in fair condition, horses good but scarce. Merino and Cape sheep also doing well, though not fat. Angoras in good condition. Ostriches and pigs fair.

Uitenhage.—The rainfall has varied a good deal in this district which is a very large one. But, taken all round, it may be described as a favourable season, and with further rains in the less favoured parts the prospects are very promising. Oats are a good crop slightly rusted in places, and there are very heavy sowings of mealies but these are not promising. Fruit is very promising. Red scale is troubling the citrus trees, and black aphid the young growth. With exception of a few cases of gall-sickness, cattle are doing well. Horses are fairly conditioned but scarce. Merino and Angoras are all doing well, while ostriches are thriving well this season. Tape-worm is prevalent in the younger birds, and great damage was done to nests by jackals and baboons. The laying season was good. Pigs are doing well.

Uniondale.—A very heavy rainfall recorded here this season which has been succeeded by calm but rather cold weather. The veld is excellent. Wheat is looking very well, and more is sown than in former years. Oats are a smaller crop but very promising. Mealies are also promising, while lucerne is doing very well. Fruit

trees are mostly bearing well. Late frosts have done a little damage. Stock are all doing well. Cattle are in good condition and free of disease, and the creamery is well supported. Horses are doing well but are scarce and dear. All sheep are doing well, the wool clip being well up to the average. Angoras are also prospering and the clip of Mohair is heavy. Ostriches are also thriving.

Van Rhynsdorp.—The rainfall has varied a good deal in this district and the veld and crops have been affected accordingly, but on the whole the season is more wet than last. Rust has damaged a good deal of the wheat and the oat crop is poor. A heavy sowing of mealies. Wind and birds have played havoc with the fruit, caterpillars adding their quota. Vines are doing well and a good crop promises though it is early yet to judge. Cattle are doing fairly well with little or no disease. Horses and mules are poor and mangy. Sheep are doing well and wool is promising. Scab is prevalent but improving since dip was obtainable. Wild ostriches are abundant. Pigs are in poor condition as feed is scarce.

Victoria West.—The season is very dry in this district, the veld is in very poor condition. There are practically no crops on account of the drought, war and late sowing. A few farms with permanent springs are flourishing. Young fruit is plentiful—principally peaches, apricots and pears. All stock is very scarce and low in condition, most having been moved for better pasturage. Large numbers of lambs were lost through the drought.

Vryburg.—No rain having fallen since September the veld is beginning to present a parched appearance. It is also intensely hot and the little grain sown wants rain badly. Fruit does fairly well. Stock generally is in good condition but lung sickness has broken out. The calving promises well. Horses in fairly good condition but mange still troublesome. Sheep doing well and scab disappearing through dipping. Goats in fair condition and no scab. Wild ostriches are breeding now.

Victoria East.—The country was getting very dry, and water becoming scarce up to the 13th inst., when a heavy storm broke over the district replenishing the dams and water courses. Very little wheat has survived this season and the oat crop is not nearly so good as that of last year, owing to the drought. All the earlier crops of mealies and Kafir corn are burnt off by the drought. Fruit and vines are suffering from the same cause. Cattle are falling off in condition and a couple of cases of sponzietke are reported. The calving season promises well. Slaughter cattle in good condition and commanding good prices. Horses scarcer and dear, but good. Sheep and young goats are suffering from heartwater. Ostriches doing well but bad season for chicks. Feathers very promising.

Worcester.—Heavy rains fell to the end of October, but very little during November. The veld remains in good condition, though getting dry just now. Wheat is not a large crop and rust is prevalent. Oats are excellent and heavy returns are expected. Lucerne doing well and cultivation spreading rapidly. Fruit not so promising, owing to late rains and wind. Woolly aphis and red spider prevalent. Vines are doing well and good yield expected, mostly Cape stocks. Cattle, horses, and mules are doing very well. Sheep and goats (Cape) also prospering.

THE TRANSKEI.

Made up to the end of October.

Bizana.—I am sorry to state the rainfall during the month has been very small, there has been a good deal of damp weather but very few showers heavy enough to do any good. The general rule being mist and drizzle. The pasture is in beautiful order and stock are looking very well, but the prospects of the next harvest are certainly anything but good. There has been one case of lung-sickness in the district, the rest of the herd were quarantined and the disease appears to have died out.

Butterworth.—There has been no rain during the month, high winds have prevailed and the pasturage is drying up, ploughing is at a standstill, and the prospects of a good harvest are very poor. Stock keeps in good condition. No locusts.

Elliott.—Nice rains have fallen in the district during this month (October) and ploughing is proceeding. One fresh case of Rinderpest has been reported but the disease is well in hand.

Elliotdale.—During the past month (October) very little rain has fallen, and as it is now late in the season this is badly wanted. Very little ploughing has been done, the ground being too hard. The pasturage is however still good, and all stock, except a few cases of gall-sickness, are in good health and condition.

Engcobo.—No rain fell in October which was a very wet month in the previous year. Weather very windy, veld not very good for time of year. The general condition of the cattle can only be described as fair. Rinderpest still lingers, and there are a few cases of lung-sickness and redwater. Mange is very severe among horses, sheep are rather low in condition and scab is prevalent. Owing to the drought no mealies have yet been sown.

Flagstaff.—There has been no rain during the month, and the natives have done very little ploughing, this has caused the price of grain to rise. Considerable quantities of both mealies and Kaffir corn have been sent to Port St. John by local traders for shipment to East London. A large quantity of grain has also been forwarded to Umtata and other parts of Tembuland by enterprising natives as they there realize higher prices. If the dry season continues much longer the outlook for the coming year will be very doubtful. Stock of all classes are in excellent condition and command good prices, buyers from Natal continually patrol the district. There is no disease of any kind amongst stock.

Idutywa.—During the past month it has been very hot and dry with high winds which have parched everything up, Very little ploughing has been done and, if we do not get rain, no more will be done. Stock is in good condition. The sheep are being dipped and it is hoped that the scab will be eradicated.

Kentani.—During the past month little or no ploughing has been done. This has been due to want of rain. The pasturage is still good, but rain is much wanted for ploughing. Stock look well. Two cases anthrax occurred during the month. Infection supposed to be imported from the Colony.

Kokstad —Very little rain fell during the month of October, and the farmers were unable to sow any mealies. There is every prospect of a fair crop of forage and wheat. No diseases amongst cattle, horses &c. have been reported during the month and stock of all descriptions appears to be doing well.

Kentani.—Very light rains in October with changeable weather since and dry. Locusts have disappeared and the veld begins to look dry though it is good as yet. Two cases of anthrax reported in cattle, otherwise doing well. Horses are in good condition, scarce and fetch high prices. Sheep not doing so well and the wool is full of burr. It is too dry to plough as yet so nothing has been sown.

Libode.—Contrary to general expectation the past month has proved an exceptionally dry one and no rain of any quantity has visited the district. Consequently a large number of natives have not yet commenced ploughing operations and the outlook is at present of a rather gloomy description. The traders are, however, profiting very considerably through the continued drought regarding the sale of cereals, and mealies have advanced in price very much and are at present fetching 30s. per muid sack. Stock of all kinds are in good condition, but the veld is sadly in need of a steady and soaking rain.

Lusikisiki—Refreshing rains have fallen, though not in sufficient quantity to afford much benefit to the agriculturist. A smaller extent of land has in consequence been placed under cultivation and I think the yield this year will be inferior to former occasions. Stock, with the exception of horses, appear to be in good order. I believe that glanders exists in a latent state and am having local horses watched.

Matatiele.—The rainfall during the past month (October) was very scanty and only a small portion of the lands has been placed under cultivation. The veld, however, has been good and all stock have continued to improve. One outbreak of lung sickness was reported and has been duly dealt with. The lambing season so far has been excellent. No locusts have appeared.

Maclear.—October was a very dry month and the veld is suffering for want of rain. One case only of rinderpest, and cattle doing fairly well. Horses are also doing well, and sheep show up fair. Crops are an uncertain quantity as very little has been sown. Mealies are ruling at 25s. per bag. Hailstorms and frost have damaged the fruit.

Mount Frere.—With little rain and variable weather October was not a promising month. The veld remains good on the uplands but is poor on the rivers and in the bushveld. There is a little lung sickness in cattle but otherwise horned stock are doing well. Mange is general among the native horses. Sheep are doing well but the wool is inferior, short and badly cut up. Scab is prevalent, slaughter stock in good condition but scarce. Cape goats are doing well and fetching high prices. Crop prospects are poor owing to the drought. Mealies are just coming up but small chance of a crop. No Kafir corn sown.

Mount Fletcher.—The weather during the month has been variable: Very little rain fell, the rain gauge registering .65. High winds have prevailed from every quarter. I am afraid if no rain falls before the middle of November that there will be a scarcity of grain, as most of the people have been unable to plough owing to the dearth of rain. The veld is fair considering the want of rain, and stock is in good condition. One or two cases of lung sickness have been reported and the infected herds have been promptly quarantined.

Mount Ayliff.—October compares badly for rainfall with previous seasons and the country is now much in want of rain. The veld is good, but mealies and Kafir corn which were sown in small patches where the soil was soft are not at all promising. Fruit seems to be doing well, mostly peaches, apricots and strawberries. Cattle and horses are improving and realising high prices. Sheep and goats are

doing well. Slaughter stock is dear and difficult to obtain. Pigs are plentiful and realise fair prices.

Mquanduli.—There is nothing to report, no sickness amongst stock, of an infectious or contagious nature, has been reported. A few cases of gall deaths have occurred. Agriculture is at a stand-still, as usual at this time of the year. Rain is badly wanted and the weather as I write (Nov. 1), shews every appearance of its proximity. The increase of cattle during the five years since Rinderpest is very noticeable.

Ngqelini.—The drought, still continues and consequently no ploughing has been done. Stock of all kinds are in a flourishing condition. Although the Scab Regulations have not yet been enforced in Pondoland many thousand sheep have already been dipped this season.

Nqamakwe.—This month has been the driest in October known since the establishment of a rain gauge at this station. Cold South-westerly gales have alternated with hot scorching North-west winds, and the young crops, sown after the good rains which fell in September, will perish if rain does not fall soon. The grass is good and abundant in some parts of the district and scanty and withered in others. Stock of all kinds in fairly healthy condition.

Qumbu.—October was exceedingly dry, no rain to speak of having fallen. As a consequence no ploughing has been done, except in the higher lying localities which catch all the misty rains. One outbreak of lungsickness has occurred, the affected beast having died. There are no further cases. The pasturage, although suffering from the drought, still keeps in fair order.

St. Johns.—No agricultural operations are proceeding at present owing to the absence of rain, without which no ploughing can be done. Stock are healthy and in poor condition.

St. Marks.—The weather, during the past month, has been very dry, and rain is badly needed. Stock, large and small, are in a fair condition, and as far as I am aware, free of any contagious or infectious diseases. Pasturage, although dry, is plentiful.

Tsolo.—Very dry weather during the whole of October, throughout the greater part of the district. In the western portion sufficient rain fell to enable those who took advantage of it to plough but generally speaking very little ploughing as a whole has been done, and if we do not soon get rain the outlook is not encouraging. Small stock has been doing well, but several deaths of cattle have been reported, the alleged disease being gall-sickness. The country is full up with grass.

Tsomo.—The rainfall registered during the month was 0·31 inches. The country is looking very dry, in parts the grass has been scorched by the hot sun and dry winds, rain is badly wanted. An outbreak of rinderpest was reported during the month, the several kraals were quarantined, inoculation was resorted to as a means of preventing the disease spreading among the herds. No other diseases among cattle were reported. Stock are still in fair condition, if we do not have rain at an early date I fear in most parts of the district there will be little or no pasturage for them.

Tabankulu.—The weather in October was unseasonably cold and rain is badly wanted for ploughing. The veld is good. Crops are practically non-existent, awaiting the rains. A small quantity of oats are doing fairly well. Cattle and horses seem fairly healthy, no disease having been reported. Sheep are in good condition the district being free of scab owing to the act being in force.

Umtata.—The month of October, was very dry, cold and hot weather alternating, a severe frost occurring on the 7th, doing much damage to fruit, the pasturage is still abundant, but drying fast. Cultivation has been entirely suspended, and great anxiety prevails amongst the natives for the coming season, while grain is rapidly rising in price. Stock is in good condition. The outbreak of Rinderpest at Baziya, is well in hand, and now limited to three kraals, all near together. A disease which local experts, are unable to diagnose has broken out amongst horses belonging to the Cape Mounted Riflemen. So far only imported horses have been affected by it, four deaths have taken place.

Umzimkulu.—The weather during the past month was very variable alternating in extremes of heat and cold. A good deal of rain, however, fell and the pasturage is good. All kinds of stock continue to keep healthy and I am pleased to report that there is not at the present moment a single case of lungsickness in the district. Mange amongst horses is rather prevalent but owners appear to be making every effort to eradicate this scourge. Ploughing is in full swing and large tracts of new land are coming under the plough and the Natives seem to be realizing the benefit that will accrue to themselves by having grain to sell in addition to that actually required for their own consumption. I anticipate splendid crops this season.

Xalanga.—The whole of this district is suffering severely for want of rain. Cattle and other live stock are low in condition for this time of the year. There have been only a few cases of rinderpest, the disease appears to be dying out. Grain crops are not looking well and in some parts of the district wheat and oats are suffering from the ravages of insect pests.

ARTIFICIAL MANURES.

The annexed list showing the agents from whom the various artificial manures may be obtained, and the current prices, is published for the information and guidance of agriculturists.

Full particulars as to the composition of the respective fertilizers can be obtained on application to the agents; and attention is also invited to the analyses published in the *Agricultural Journal* of 9th January, 2nd April and 11th June, 1896; 30th Sept., 1897; 27th Oct., 1898; 13th April, 6th July, 1899 and 18th July, 1901.

LIST OF FERTILIZERS.

Attwell & Co., Cape Town. (Agents for Alex. Cross & Sons, Ltd., Glasgow.)	Special Root Guano	..	£6	10	0	per ton of 2,000 lb.
	Potato and Grain Guano	..	8	5	0	" "
	Nitrate of Soda	..	12	0	0	" "
	Superphosphates 39/40 per cent.	..	6	0	0	" "
	Scotia Basic Slag (cont. 30 per cent. Tribasic Phosphate of Lime)	4	15	0		" "
	Sulphate of Ammonia	..	0	19	6	per 100 lb. "
(Prices free on trucks, Cape Town)						
Jas. Searight & Co., Cape Town.	No. 1 Superphosphates	..	£5	0	0	per ton of 2,000 lb.
	(containing 12·14 per cent. Phosphoric Acid soluble in water, being equal to 26·30 per cent. Tribasic Phosphate of Lime).	..				
Jas. Searight & Co., Cape Town.	No. 2 Superphosphates	..	5	10	0	" "
	(containing 14·16 per cent. Phosphoric Acid soluble in water, being equal to 30·35 per cent. Tribasic Phosphate of Lime).	..				
	No. 3 Superphosphates	..	£6	0	0	per ton of 2,000 lb.
	(containing 17·18 per cent. Phosphoric Acid soluble in water, being equal to 37·39 per cent. Tribasic Phosphate of Lime).	..				
	Vine Fertilizers	..	9	0	0	" "
A reduction of 5s. per 2,000 lbs. is allowed on orders of 100 bags or more. Special rates can be arranged if delivery is taken ex importing steamer, the goods being trucked at Docks.						
Woodhead, Plant & Co. Cape Town.	Thomas' Phosphate Powder	..	£4	15	0	per ton of 2,000 lb.
	Superphosphates	..	5	15	0	" "
	Nitrate of Soda	..	14	0	0	" "
	Muriate of Potash	..	16	0	0	" "
	Sulphate of Potash	..	10	0	0	" "
	Wheat Fertilizer	..	8	10	0	" "
	Kainit	..	4	15	0	" "
	Potato	..	1	15	0	per 200 lb.
	Vineyard Manure	..	1	15	0	" "
	Tobacco Manure	..	1	15	0	" "
Sulphate of Ammonia						
Subject to a discount for cash.						
De Waal & Co., Cape Town.	Jadoo Fibre	..	10s.	6d.	per bale of 100 lb.	

"White, Ryan & Co., Cape Town.	Potato, and Market Vegetables ..	£9 per ton of 2,000 lbs.
	Special Gardening	16s. per bag, 100 lbs.
	Pure Ground Bone for Trees and Vines	£8 per ton of 2,000 lbs.
	Bone and Potash Mixture for Trees and Vines	£8 10s. per ton of 2,000 lbs.
	Pure Bone Meal for Cattle ..	20s. per 100 lbs.
	Medicated Meal for Cattle ..	20s. per 100 lbs.
"Malcomess & Co., E. London.	Pure Bone Grit for Fowl ..	15s. 6d. per 100 lbs.
	"Malcomess" A. Fertilizer, for Potatoes, Mealies, Vegetables, Orange and other trees ..	£9 per ton of 2,000 lb.
	"Malcomess" B. Fertilizer, for cereals, especially wheat ..	£9 per ton of 2,000 lb.
'James Flower & Sons, Cape Town.	Accompanied by guaranteed analysis by Prof. Hahn ..	(less 5 per cent for cash).
	"H.B.T." Gypsum	£3 10s. per ton of 2,000 lb.
	Pure Ground Bone Meal ..	£8 10s. (in bags f.o. trucks—Cape Town).
Government Guano:—Ordinary Guano		£6 10s. per ton of 2,000 lb. or 13s. per bag of 200 lb.
Rock Guano		£6 17s. per ton of 2,000 lb. or 13s. 9d. per bag of 200 lb

For use within limits of Colony.

Price includes delivery at Cape Town Railway Station.

D. E. Hockly & Co., East London.	"Hockly's Special Fertilizer."}	£9 per ton of 2,000 lb.
	A complete manure for all crops }	less 5 per cent for cash.
	Pure Bone Meal	Special Price.
J. G. Steytler & Co., Cape Town.	Phosphates or Basic Slag	£4 2 6 per ton of 10 bags each 200 lb.
	Superphosphates .. 4 12 6	" " "
	Dissolved Bone .. 6 7 6	" " "
	Grain Fertilizer .. 7 0 0	" " "
	Potato Fertilizer .. 8 0 0	" " "
	Vine Fertilizer .. 8 0 0	" " "
Henry Ries & Co. East London.	Agents for the Lawes Chemical Manure Co., Ltd., of 59, Mark Lane, London, who prepare fertilizers for them, which they sell at the undermentioned rates:—	
	Ries' Potato Fertilizer ..	15s. to 17s. 6d. per bag of 200 lb.
	" Special Dissolved Bone ..	8s. 6d. to 10s. " of 100 lb.
	" Special Cereal Manure ..	8s. 6d. to 10s. " of "
	" Ordinary .. 7s. 6d. to 9s.	" of "
		" of "

For the potato fertilizer they make a reduction of 1s. 6d. per bag on orders for 10 to 25 bags, 2s. on orders for 30 to 50 bags, and 2s. 6d. on orders for 50 to 100 bags. For the other three lines they make reductions of 6d., 1s. and 1s. 6d. per bag respectively on orders for 10 to 25, 30 to 50, and 50 to 100 bags. Analysis guaranteed as per list.

THE PRODUCE MARKET.

CAPE TOWN.

Messrs. Wm. Spilhaus and Co. report under date, November 22nd, as follows:—
Ostrich Feathers.—Business was resumed on our local market this week, when only a small quantity was offered. Competition was fair for all descriptions of good quality, but others showed no change compared with last sale's rates. Business for the day, 464 lb., which sold for £788.

	£	s.	d.		£	s.	d.		£	s.	d.		£	s.	d.
Whites (primes)	10	10	0		15	0	0	Blacks (Long) ..	4	0	0		6	0	0
Firsts ..	7	10	0		10	0	0	Long Medium	2	10	0		3	10	0
Seconds ..	5	10	0		6	10	0	Medium ..	1	0	0		1	10	0
Thirds ..	3	10	0		4	10	0	Short ..	0	5	0		0	10	0
Inferior and stalky	1	10	0		2	0	0	Long Floss ..	1	5	0		1	10	0
Byocks ..	4	10	0		6	0	0	Medium Floss	0	7	6		0	10	0
Feminas (super)	6	10	0		8	10	0	Short Floss ..	0	2	6		0	5	0
Firsts ..	4	10	0		5	10	0	Drabs (Long) ..	2	5	0		3	5	0
Seconds ..	3	0	0		4	0	0	Long Medium	1	5	0		1	10	0
Thirds ..	2	0	0		2	10	0	Medium ..	0	10	0		1	0	0
Inferior ..	0	10	0		1	0	0	Short ..	0	2	0		0	4	0
Dark ..	3	10	0		5	0	0	Long Floss ..	1	5	0		1	10	0
Spadonas (White)	1	10	0		2	10	0	Medium ..	0	5	0		0	10	0
Light and Dark	0	10	0		1	0	0	Short ..	0	2	0		0	3	0
Boos (White) ..	1	0	0		1	10	0	Inferior Long							
Light ..	0	17	6		1	5	0	Blacks & Drabs	0	15	0		1	0	0
Black Butts ..	0	7	6		0	10	0	Floss ..	0	4	0		0	5	0
Dark ..	0	7	0		0	10	0	Wiry ..	0	0	6		0	0	6
Inferior ..	0	3	0		0	5	0	Chicks ..	0	0	6		0	1	0

Wool.—During the week about 1,100 bales were offered, and mostly sold. At a sale held on Wednesday, competition was very keen, and extreme prices were paid. The excitement was chiefly owing to an outside buyer being present. Yesterday the tone was not so brisk, mostly irregular wools being offered, but all the lots fetched fair values. We expect when the new buyer has left, the market will resume its former position, and we have therefore decided not to change our quotations. The last series of the London wool sales will commence on Tuesday, the 28th inst., and we shall report opening news in our next. We quote: Karoo grease for combing, 5½d. to 6½d. per lb.; Karoo grease for scouring, 4½d. to 5½d. per lb.; snow-whites, ordinary, 1s. 0½d. to 1s. 1½d. per lb.; snow-whites, super, 1s. 2½d. to 1s. 4½d. per lb.; snow-whites, extra super, 1s. 5d. to 1s. 5½d. per lb.

Skins.—By cable we hear that at the goatskin sale held in London, heavy and medium weights sold at a decline, lights at about par, whilst extra light and damaged skins obtained an advance on last sale's rates. We do not expect that prices here will show any material change, but as they have not as yet been fixed, our quotations are nominal. We quote, Merino long wools, 5½d. per lb.; merino short wools, 4½d. per lb.; pelts, 3½d. per lb.; bastards, 3½d. per lb.; goatskins (sound), 10d. per lb.; sundried, 6d.; scurvy, 6d. each; Angoras, 4d. per lb.; pelts, 3d. per lb.; Capes, 1s. 10d. each; cut, 1s.; damaged, 6d. each; other descriptions according to quality.

PORT ELIZABETH.

Messrs. John Daverin & Co., of Port Elizabeth, report under date, November 12:—
Ostrich Feathers.—The market was well supplied this week with an assortment quite up to the usual average. Competition was fairly active, and prices firm, especially for good qualities. The total value sold amounted to £10,058 11s. and weighed 5,562 lbs., 13½ ozs. - We quote:—

	£	s.	d.		£	s.	d.		£	s.	d.		£	s.	d.
Primes Good to								Blacks Long ..	3	10	0		6	0	0
super ..	12	0	0		18	0	0	Medium ..	1	5	0		2	10	0
Whites Firsts ..	8	0	0		10	10	0	Short ..	0	5	0		0	15	0
Seconds ..	5	15	0		7	10	0	Wiry ..	0	0	6		0	1	0
Thirds ..	3	10	0		5	10	0	Floss ..	0	5	0		1	7	6
Feminas Tipped								Drabs Long ..	2	0	0		3	5	0
and Grey ..	5	10	0		9	10	0	Medium ..	0	15	0		1	15	0
Seconds ..	2	15	0		4	10	0	Short ..	0	1	6		0	5	0
Thirds ..	1	5	0		2	10	0	Wiry ..	0	0	6		0	1	0
Fancy ..	4	10	0		7	0	0	Floss ..	0	5	0		1	7	6
Tails White ..	1	2	6		1	10	0	Spadonas Light	1	5	0		2	10	0
Light ..	0	15	0		1	0	0	Dark ..	0	12	6		1	10	0
Coloured & Dark	0	4	0		0	12	6	Chicks ..	0	0	3		0	1	0

Wool.—This market continues firm, and a fair amount of business has been done during the week at full current prices. We quote :

Snowwhite Extra ..			Grease, Short, faulty		
Superior ..	16d	16½d	and wasty ..	1½d	17d
Snowwhite Superior ..	15d	15½d	Grease, Coarse and		
Do Good to Superior	11d	14½d	Coloured ..	2½d	3d
Do Inferior Faulty	12½d	13½d	Scoured, Coarse and		
Grease, Super Grassveld	7d	8½d	Coloured ..	5½d	8d
Do Karoo ..	6½d	7d	Free State Grassveld		
Do Mixed Veld	6½d	7d	Grease, long ..	5½d	57d
Grease Light, faultless,			Free State medium		
medium Grassveld..	6d	7d	grown, light, ..	5d	5½d
Grease, Light, faultless,			Free State short, faulty		
medium Karoo ..	5½d	57d	and wasty ..	1½d	17d
Grease, light, faultless,			Free State Karoo, long	17d	5d
medium short Karoo	5½d	5½d			

Mohair.—This market has been very active during the week, and about 1,000 bales have been sold at for Firsts 11d to 11½d, Winter Kids 13½d, Winter 9½d. The bulk of the stock of Summer Firsts in Port Elizabeth will not exceed 350 bales and about 1,000 bales of Summer Kids, for which at present there is no demand. There is no stock of Winter and only a small quantity of Winter Kids. We quote .

Kids, superfine ..	1s 7d	1s 8d	Mixed Free State Hair	0s 8½d	0s 9½d
Superior Clips ..	0s 11d	0s 11½d	Seconds and Grey ..	0s 6d	0s 8d
Ordinary Clips ..	0s 10d	0s 10½d	Thirds ..	0s 4d	0s 1½d
Long Blue Free State			Winter ..	0s 9½d	0s 9½d
Hair ..	0s 10d	0s 11½d	Do. Kids ..	1s 1½d	1s 1½d

Skins.—Sheepskins sold this week at 5½d in bundles; Pelts, 3½d, Capes, 1s 2½d; damaged, 5½d each; Angoras, 5½d; Shorn, 4½d; damaged, 2½d; Goat, 11½d; damaged, 5½d per lb; Springbok, 9d each.

Hides.—Sundried Hides sold this week at 7½d, and for damaged 5½d; Drysalted 6½d and Thirds 4d.

Horns.—Parcels all round fetched 4½d each.

EAST LONDON.

Wool.—During the week (says the *Dispatch* of the 14th November) a total up to some 800 bales, the bulk of which have been Transkeian native grease, sold at 5½d. or an advance of ½d. since the season for these opened. Kaffrarian farmers have also been dealt in in fair quality, the prices made varying considerably according to style and condition of the staple. From 6d. up to 7½d. per lb. has again been made, the latter, however, only for specially light and stylish Kei Road clips: others lacking in appearance mostly making 6d. to 6½d. Long wools from Kei Road also in good condition rule from 7½d. to 8d., while others off colour and faulty of staple make fully 1d. per lb. less. The prices for Kaffrians therefore are practically for the week unchanged. For Burghersdorp short wools 4½d., Albert and Dordrecht style of short 5l. to 5½d., Long O.R.C. in fair condition 5½d., with a few bales at 5½d. Sound staple comprise the week's business. Receipts being rather in excess of actual sales, stocks are slightly augmented. The bulk of such holding is, however, rather mixed stuff, chiefly old wools held back in the O.R.C., which are passed over in favour of the more attractive staple now available.

LONDON WOOL SALES.

Reuter's Agency cabled on the 25th November from London:—The sixth series of Colonial wool sales opened to-day, the tone of the market being firm, and sales active. Prices ranged from par to 5 per cent. dearer as compared with last sales,

On the 26th a further cable said:—At the wool sales to-day, super snow-whites, snow-white, scoured, light and grease wools showed a half-penny advance, as compared with last sales: while fleece-washed wool ranged from par to a half-penny dearer.

GOVERNMENT NOTICES.

Farmers' Apprentices. Dairy Assistants, &c

As inquiries are from time to time received from young men from abroad as to where they may serve apprenticeship or gain practical experience of farming in this Colony, before starting on their own account, the Secretary for Agriculture invites Farmers who are willing to receive young men of good character, for this purpose, to register their names with the Under Secretary for Agriculture, stating the class of farming they do, how many young men they are prepared to take, and for what period they would enter into an agreement.

It is not probable that these young men will be in a position to give more than their free services in return for the experience they will gain; that is, they will not be able to pay any fee; and they will look to receiving free board and lodging in return for their services.

It is to Farmers, therefore, who are willing to grant such young men free board and lodging in return for services rendered, that this application is especially addressed.

With reference to the above notice to Farmers, the Secretary for Agriculture now invites young men who are willing to engage themselves as Farmers' Apprentices in Cape Colony to register their names with the Under Secretary for Agriculture, Cape Town. The apprentice will gain experience in farming in South Africa, and have an opportunity for spying out the land before starting on his own farm. To the new comer from another country this is essential, for he has much to learn and unlearn.

Many applications for such Apprentices have been received from Farmers in the Colony. It will be noted that the Apprentice will neither receive wages, nor pay a fee. He will get free board and lodging in return for his services, and at the same time acquire the experience he is in need of.

Applications for employment have also been received from several Lady Dairy Experts and Dairy Assistants; and Dairy Farmers and others desiring to avail themselves of the services of such are invited to register their names with this Department, giving particulars as to situation and extent of operations, etc. and salary and other emoluments they are prepared to offer.

The Outbreak of Rabies.

By command of H.E. the Governor the following Proclamation No. 163 of September 4th, 1902 is published in the *Government Gazette*.

Under and by virtue of the powers and authorities vested in me by Act No. 27 of 1893, entitled the "Animal Diseases Act 1893," I do hereby proclaim, declare and make known that whereas it has been represented to me that the disease known as Rabies is prevalent among Dogs in Southern Rhodesia, the introduction of all Dogs and other Carnivora and Monkeys from Southern Rhodesia or from the Bechuanaland Protectorate into this Colony shall be and is hereby prohibited, and that all Dogs and other Carnivora and Monkeys which may enter or be introduced into this Colony in contravention of this Proclamation shall be liable to be destroyed.

And I do hereby declare that this Proclamation shall have effect from and after the date hereof, and shall continue in force until amended or repealed.

And I do strictly charge every Resident Magistrate, Field-cornet and Justice of the Peace to see that this Proclamation is obeyed, and to bring to justice any person who may contravene the same.

Cattle from German South-west Africa.

By Command of H.E., the Governor, the following Proclamation, No. 122 of 1901, is published :—

Under and by virtue of the powers vested in me by Act No. 47 of 1893 and Act No. 2 of 1897, I do hereby proclaim, declare and make known that notwithstanding anything contained in the Proclamation, No. 18, bearing date January 21, 1901, it shall and may be lawful, from and after the date hereof, to introduce Horned Cattle into this Colony from that portion of the Territory of German South West Africa, which lies south of the Quarantine Belt established by the Government of the said Territory at about the 24th parallel of South Latitude, subject to the Regulations contained in the Schedule hereto.

GOD SAVE THE KING.

Given under my hand and the Public Seal of the Colony of the Cape of Good Hope, this 15th day of July, 1901.

WALTER HELY-HUTCHINSON,
Governor.

By Command of His Excellency the Governor in Council,
F. H. FAURE.

Schedule to foregoing Proclamation..

(1) The person in charge of the cattle introduced under this Proclamation shall obtain and have in his possession a certificate in the form set forth in Annexure "A" hereto, issued and signed by a competent and responsible Officer or person delegated for this purpose by the Government of German South West Africa.

(2) The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, to any Field-cornet, Police Officer or owner of land which the cattle may pass or be passing.

(3) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding Fifty Pounds Sterling, or in default of payment to imprisonment with or without hard labour for any period not exceeding Three Months unless such fine be sooner paid.

ANNEXURE "A."

I do hereby certify that the undermentioned cattle have not come from a locality north of the Quarantine Belt established by the Government of German South West Africa about the 24th parallel of South latitude, nor from a locality in which contagious disease is known to exist, and that they are free from disease, viz :—

Number and general description of cattle and place from which sent.	}
---	---------

Owner's name and address.	}
---------------------------	---------

Name of person in charge.	}
---------------------------	---------

Place in Cape Colony to which cattle are being sent.	}
--	---------

Signature of Official of German
Government.

Title.....

Place

Date.....

Cattle from Queensland, United States of America and Argentina.

REGULATIONS FOR IMPORTATION.

By command of His Excellency the Governor, the following Proclamation No. 138, 1902, is published in the *Government Gazette* :—

Under and by virtue of the powers and authorities vested in me by the provisions of Act No. 27 of 1893, entitled "The Animal Diseases Act, 1893," I do hereby proclaim, declare and make known that, in terms of Section 6 and 7 of the Act aforesaid, I have issued and do hereby issue the following Regulations, as set forth in the Schedule hereunto annexed, regarding the importation or introduction of cattle into this Colony from the State of Queensland (Australia), the United States of America and Argentina.

And I do hereby declare that these Regulations shall have effect from and after the 1st September, 1902, and shall continue in force until amended or repealed.

Schedule to foregoing Proclamation.

REGULATIONS REGARDING THE IMPORTATION OF CATTLE FROM QUEENSLAND, UNITED STATES OF AMERICA AND ARGENTINA.

1. Cattle from the abovementioned countries may be landed at the Ports of East London and Port Elizabeth, subject to inspection and issue of Clean Certificate at such port as provided by law.

2. Such Cattle may also be landed at the Ports of Cape Town and Mossel Bay, provided they are accompanied by a Certificate in the subjoined form.

CERTIFICATE.

I do hereby certify that the undermentioned cattle are free from disease, and have not come from a locality in which the disease known as Redwater, Texas Fever, Tick Fever, or Tristeza is indigenous, and in which healthy cattle from non-infected areas are liable to become infected with the said disease.

Number and general description of cattle.....
Place from which cattle have come.....
Name of consignee at Cape Town or Mossel Bay.....

Signature*.....

Title..

Place

Date.....

Redwater in Rhodesia.

PROHIBITION OF INTRODUCTION OF CATTLE FROM SOUTHERN RHODESIA.

By command of His Excellency the Governor the following Proclamation No. 139, 1902, is published in the *Government Gazette* :—

Whereas the disease known as Redwater is prevalent amongst cattle in Southern Rhodesia :

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1893, the introduction of cattle from Southern Rhodesia into any part of this Colony shall be and is hereby prohibited, and that all cattle which may enter this Colony in contravention of this Proclamation shall be liable to be destroyed.

And I hereby declare that this Proclamation shall have effect from and after the date hereof, and shall continue in force until amended or repealed.

And I do strictly charge every Resident Magistrate, Field-cornet and Justice of the Peace to see that this Proclamation is obeyed, and to bring to justice any person who may contravene the same.

*To be signed by an Officer specially authorized to perform the duty by the Government or State Administration of the country from which the cattle are shipped.

Prohibition of the Importation of Grass Hay from Southern Rhodesia.

By Command of H.E., the Governor, the following Proclamation, No. 166, of September, 10th, 1902, is published in the *Government Gazette*:

Under and by virtue of the powers and authorities vested in me by Act No. 9 of 1876, intituled "Act to regulate the introduction into this Colony of articles or things which by reason of disease or otherwise might be injurious to the interest thereof," I do hereby proclaim, declare and make known that whereas, the infection of Redwater may be conveyed by means of Grass Hay, the importation of Grass Hay from Southern Rhodesia, or from the Bechuanaland Protectorate, shall be and is hereby prohibited; and that all Grass Hay which may enter or be introduced into the Colony in contravention of this Proclamation shall be liable to be destroyed.

And I do hereby declare that this Proclamation shall have effect from and after the date of publication hereof, and shall continue in force until amended or repealed.

And I strictly charge every Resident Magistrate, Field-cornet and Justice of the Peace to see that this Proclamation is obeyed, and to bring to justice any person who may contravene the same.

Rinderpest Regulations.

The following Regulations have been proclaimed by H.E. the Governor under Act No. 2, 1897. (The Animals Diseases Rinderpest, Amendment Act, 1897).—

PROCLAMATION, No. 151, AUGUST 23RD, 1902:

It shall not be lawful for public sales of horned cattle to be held in the District of Wodehouse.

PROCLAMATION, No. 152, AUGUST 23RD, 1902:

1. From and after the date hereof it shall not be lawful to remove from any portion of the District of Wodehouse into the adjoining Districts of Queen's Town and Glen Grey any horned cattle or the carcasses, hides, biles or any other portions of such cattle.

2. Any person contravening the provisions of this my Proclamation shall, on conviction, be liable to forfeit any sum not exceeding one hundred pounds (£100) sterling, and in default of payment thereof to imprisonment with or without hard labour for any period not exceeding six months, unless the fine be sooner paid.

3. And I do strictly charge every Resident Magistrate, Field-cornet, Justice of the Peace, and Inspector of Native Locations to see that this Proclamation is obeyed, and to bring to justice any person who may contravene the same.

PROCLAMATION, No. 162, SEPTEMBER 4TH, 1902.

Under and by virtue of the powers in me vested by the Animal Diseases Act No. 27 of 1893, and the Animal Diseases Rinderpest Amendment Act No. 2 of 1897, I do hereby proclaim, declare and make known that, owing to the existence therein of the disease amongst cattle known as Rinderpest, the areas named in the Schedule hereto shall be deemed to be areas infected with Rinderpest, from which areas, it shall not be lawful, from and after the date hereof, to remove into the Transvaal Territories any horned cattle or the carcasses, hides, biles or any other portions of such cattle.

Any person contravening the provisions of this my Proclamation shall, on conviction, be liable to forfeit any sum not exceeding one hundred pounds (£100) sterling, and in default of payment thereof to imprisonment with or without hard labour for any period not exceeding six months, unless the fine be sooner paid.

And I do strictly charge every Resident Magistrate, Field Cornet, Justice of the Peace, and Inspector of Native Locations to see that this Proclamation is obeyed, and to bring to justice any person who may contravene the same.

Schedule to foregoing Proclamation.

Districts of Barkly East, Glen Grey and Wodehouse.

PROCLAMATION No. 179, SEPTEMBER 22ND, 1902:

District of Taungs. Taungs Native Reserve.

Boundaries :—Bounded on the east by the Transvaal Colony and the farms Kopje Enkel, Home Rule, Killarney and Pudomer, on the north by the farms Verona, Stukfontein, Dwaalvlakte and Klipplaas, on the west by the farms Kgantsang, Kang, Maria Moet, Kankaro and Vaalbult, on the south by Griqualand West and farms Thoming, Hartington, Middlepark, Laseby, Rockdale, Lowestoft, Broadlea, Frisco, Sunbury and Blackpool.

PROCLAMATION No. 204, OCTOBER 20TH, 1902:

It shall not be lawful for Horned Cattle to be removed by rail or road from any place in the Districts of Barkly West, Hay, Herbert, Kimberley, Mafeking, Taungs and Vryburg to any place South of the Orange River.

PROCLAMATION No. 164, SEPTEMBER 8TH, 1902:

It shall not be lawful for public sales of horned cattle to be held in the Districts of Albert, Aliwal North, Barkly East, Herschel and Elliot.

PROCLAMATION No. 173. SEPTEMBER, 15TH 1902:

It shall not be lawful for Horned Cattle, in the Districts of Aliwal North, Barkly East, Glen Grey, Herschel and Wodehouse, to be removed beyond the limits of the respective Districts or, except upon the written permission of the Resident Magistrate of the District, from place to place within those Districts.

Rinderpest.

COMPULSORY INOCULATION.

By command of His Excellency the Governor, the following Proclamation No. 103, 1902, is published in the *Government Gazette* :—

Under and by virtue of the powers and authorities vested in me by the provisions of Act No. 2 of 1897, entitled "The Animals Diseases Rinderpest Amendment Act, 1897," I do hereby proclaim, declare and make known that I have issued and do hereby issue the following Regulations, as set forth in the Schedule hereunto annexed, for arresting the spread of Rinderpest.

And I do hereby further proclaim and make known that any person contravening any of the said Regulations shall be liable to a fine not exceeding fifty pounds, or in default of payment thereof to imprisonment with or without hard labour for any period not exceeding three months, unless such fine be sooner paid.

Schedule to foregoing Proclamation.

1. When Rinderpest has either already appeared or hereafter appears in any part of this Colony, all cattle which are infected with the disease or which may be in contact with infected cattle shall be forthwith inoculated either with serum or with glycerinated bile.

2. The inoculation shall be performed by the owner or person in charge of the cattle, or if he fail to do so, by a duly authorized officer of the Government, and the cost of the inoculation shall be borne by the owner or person in charge of the cattle.

3. No person shall, without the special permission of the Secretary for Agriculture, perform inoculation against Rinderpest with the pure bile or with virulent blood of animals affected with Rinderpest.

Rinderpest.

The outbreak of Rinderpest in the Orange River Colony and Basutoland having extended to the North-East Border of this Colony, the subjoined Regulation for checking the spread of the infection is republished.

REGULATION ISSUED UNDER PROCLAMATION No. 30, DATED 20TH JANUARY, 1899.

Whenever under the provisions of Sections 11 and 12 of Act No. 27 of 1893, any area is declared or proclaimed to be an area infected with Rinderpest, it shall not be lawful for any person, animal, animal produce, article or thing, who or which may, in the opinion of the Magistrate of the District in which such area is situated, be liable to convey infection of Rinderpest, to leave or to be removed therefrom.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM BASUTOLAND.

By command of His Excellency the Governor the following Proclamation No. 63, 1902, was published in the *Government Gazette* of April 22nd, 1902 :—

Under and by virtue of the powers vested in me by the provisions of the Act No. 27 of 1893, entitled the "Animal Diseases Act, 1893," and the Act No. 2 of 1897, entitled the "Animal Diseases Rinderpest Amendment Act, 1897," I do hereby proclaim, declare and make known that, whereas the disease known as Rinderpest is prevalent amongst cattle in Basutoland, it shall not be lawful, from and after the date hereof, to introduce or to cause or allow Horned Cattle to be introduced from Basutoland into any part of this Colony, save and except cattle in yoke and accompanied by a certificate, to be obtained and held by the person in charge of such cattle, signed by a competent and responsible officer, to the effect that such cattle are free from infectious or contagious disease and have not been in contact with infected animals or come from a locality where any such disease shall be known to exist.

And I do hereby proclaim and make known that all Horned Cattle which may enter this Colony in contravention of this Proclamation shall be liable to be destroyed.

Rinderpest.

INTRODUCTION OF HORNED CATTLE FROM ORANGE RIVER COLONY AND THE TRANSVAAL.

By command of His Excellency the Governor, the following Proclamation No. 139 1901, was published in the *Government Gazette* of August 16th, 1901 :—

Under and by virtue of the powers vested in me by the "Animal Diseases Act," No. 27 of 1893, and by the "Animals Diseases Rinderpest Amendment Act," No. 2 of 1897, I do hereby proclaim, declare and make known that it shall not be lawful, from and after the date hereof, to introduce or to cause or allow Horned Cattle to be introduced into any part of this Colony from the Orange River Colony and the Transvaal, save and except such cattle as may be required to be introduced by the Government for the purpose of supplying Bile or Serum for inoculation against Rinderpest:

And I do hereby proclaim and make known that all Horned Cattle which may enter this Colony in contravention of this Proclamation shall be liable to be destroyed

And I do hereby further declare that this Proclamation shall have effect from and after the date hereof, and shall continue in force until amended or repealed.

Proclamation No. 217, bearing date the 29th day of October, 1900, together with the regulations issued thereunder, is hereby repealed.

And I do strictly charge every Resident Magistrate, Field-cornet and Justice of the Peace to see that this Proclamation is obeyed, and to bring to justice any person who may contravene the same.

Locust Disease Fungus.

The attention of landowners and others is drawn to the provisions of Government Notice No. 1128 of 1897, wherein it is notified for general information that supplies of Locust Disease Fungus may be obtained from the Director of the Bacteriological Institute, Graham's Town, at a cost of sixpence per tube to all applicants residing in the Colony. Applicants beyond the borders of the Colony are required to pay the cost of postage in addition to the amount charged.

As the Fungus is cultivated on a moist jelly and is therefore liable to become dried up and useless if kept long on hand, it is not found possible to store supplies in the various districts of the Colony; and applicants desirous of trying the Fungus should therefore submit their applications, with a remittance for the quantity applied for, *direct* to the Director, who can always supply the Fungus in proper condition and on short notice.

Lung-Sickness.

INTRODUCTION OF CATTLE FROM OVER THE ORANGE RIVER.

By command of His Excellency the Governor, the following Proclamation was published in the *Government Gazette* of the 30th October, 1900:—

Whereas by virtue of the provisions of the Act No. 27 of 1898, entitled the "Animal Diseases Act, 1898," it is enacted that it shall be lawful for the Governor by Proclamation in the *Gazette*, to prohibit the importation or introduction into this Colony from any place beyond the same in which any infectious or contagious disease affecting animals shall be known or be supposed to be prevalent, of any such animals as in such Proclamation shall be mentioned

And whereas the disease known as Lung-sickness (Pleuro-pneumonia) is prevalent amongst cattle in the Transvaal and the Orange River Colony:

Now, therefore, I do hereby proclaim, declare and make known that, under and by virtue of the powers vested in me by the said Act No. 27 of 1898, the introduction of Cattle from the Transvaal and the Orange River Colony, save by road by way of Aliwal North, Bethulie Bridge or Norval's Pont, and subject to the regulations set forth in the Schedule hereto, shall be prohibited, such prohibition to take effect from the date of this my Proclamation.

Schedule to the foregoing Proclamation.

(1) No cattle shall be introduced into this Colony from the Transvaal or the Orange River Colony by railway.

(2) No cattle shall be introduced into this Colony from the Transvaal and the Orange River Colony by road,

(a) Unless the person in charge of such cattle shall have obtained and have in his possession a certificate with regard to such cattle, in the form set forth in Schedule A hereto, signed by a competent and responsible officer or person delegated for this purpose by the Government of the Transvaal or the Orange River Colony, and

(b) Unless such certificate shall have been countersigned or endorsed by the Inspector appointed for this purpose by the Colonial Government at Aliwal North, Bethulie Bridge, or Norval's Pont.

(3) No person intending to introduce cattle from the Transvaal or the Orange River Colony, shall be permitted to introduce such cattle unless he shall have obtained the aforesaid endorsement, and he shall, with that view, give timely notice to the Inspector, stating the number of cattle and the place, within 8 miles of Aliwal North, Bethulie Bridge and Norval's Pont, where the cattle may be inspected, and the proposed time of introduction; and upon receipt of such notice the Inspector shall proceed at the time and to the place specified in such notice, or as soon thereafter as may be possible, then and there to examine such cattle.

(4) The person in charge of such cattle shall be bound to produce the certificate aforesaid to the Inspector, and such Inspector shall, if the certificate be in order, and the cattle be free from disease, make an endorsement on the certificate in the form given in Schedule "B" hereto, and the cattle may thereafter proceed on their way. The person in charge of such cattle is liable to be called upon to produce the certificate aforesaid, duly endorsed, to any Field-Cornet, Police Officer or owner of land over which the cattle may pass or be passing.

(5) In the absence of the Certificate prescribed in regulation (2) the cattle shall be quarantined for a period not less than twenty-one days at some place on the north bank of the Orange River and in the neighbourhood of Aliwal North, Bethulie Bridge and Norval's Point where they may be inspected by an Officer of the Colonial Government, appointed for the purpose, at such intervals as may be considered necessary.

(6) On the expiration of the period of quarantine the Inspector, should he be satisfied that the cattle are free from disease, shall issue a Certificate in the form set forth in Schedule C hereto.

(7) The person in charge of such cattle as are referred to in the Certificate mentioned in regulation (6) is liable to be called upon to produce such Certificate to any Field-Cornet, Police Officer or owner of land over which such cattle may pass or be passing.

(8) Any person who shall contravene any of the provisions of these regulations shall, upon conviction, be liable to a fine not exceeding fifty pounds, or in default of payment to imprisonment with or without hard labour for any period not exceeding three months unless such fine be sooner paid.

SCHEDULE A.

I hereby certify that the undermentioned Cattle either have not mixed with and Cattle affected with Lung-sickness and are free from disease: or have been effectively inoculated against Lung-sickness and are free from disease, viz.:—

Number and general	.....
description of	.....
Cattle	.....
Owner's name and	.....
address	.....
In charge of.....	.....
Place to which Cattle are being sent.....	.....
	(Signature).....
	(Address).....
Date.....	.....

SCHEDULE B.

(Endorsement to be made by the Inspector.)

I hereby certify that I have examined the Cattle to which this Certificate refers and find them to be free from disease.

(Inspector's Signature).....
Address.....
Date.....

SCHEDULE C.

I hereby certify that the Cattle to which this Certificate refers have undergone a period of quarantine for at least twenty-one days, that I have examined them and find them to be free from disease, viz.:—

Number and general	.....
description of	.....
Cattle	.....
Owner's name and	.....
address	.....
In charge of.....	.....
Place to which Cattle are being sent.....	.....
	(Inspector's signature).....
	(Address).....
Date.....	.....

RAINFALL, NOVEMBER, 1902.

NOTE: n.r. denotes that, up to the date of publication, Returns have *not* been received from those Stations.

CAPE PENINSULA:		INCHES.	II. SOUTH-WEST—continued.		INCHES
Royal Observatory, 12	nch		Montagu	..	1.16
gauge	..	4.72	De Hoop (Div. Robertson)	..	1.21
Cape Town, (Fire Station)	..	n.r.	Groot Drakenstein	..	2.55
Do South African College	..	1.82	Porterville Road	..	1.94
Do Sea Point Hall	..	1.59	De Doorns	..	0.58
Do Molteno Reservoir	..	2.66	Rawsonville	..	..
Do Platteklip	..	3.35	Weltevreden (Caledon)	..	4.53
Do Signal Hill	..	1.60	The Oaks (Cores)	..	2.68
Table Mountain, Disa Head	..	2.60	Danger Point	..	2.26
Do Kasteel's Poort	..	6.15	Vijgeboom River	..	3.89
Do Waai Kopje	..	8.10	Bothlehem (Stellenbosch No. 1	..	4.42
Do St. Michael's	..	8.57	" " No. 2	..	3.72
Devil's Peak, Block House	..	n.r.			
Do. Nursery Gauge	..	n.r.	III. WEST COAST:		
Do. Lower Gauge	..	n.r.	Port Nolloth	..	0.16
Rondebosch	..	n.r.	Do. (Howard)	..	n.r.
Newlands (Montebello)	..	n.r.	Klipfontein	..	0.66
Bishopscourt	..	n.r.	Kraaifontein	..	n.r.
Claremont	..	1.66	O'okiep	..	n.r.
Kenilworth	..	3.98	Springbokfontein (Gaol)	..	0.89
Wynberg (St. Mary's)	..	5.03	Concordia	..	n.r.
Groot Constantia..	..	4.59	Garies	..	0.12
Tokai	..	2.83	Kersefontein	..	n.r.
Simon's Town (Wood)	..	n.r.	The Towers	..	1.38
Do. (Gaol)	..	2.55	Dassen Island	..	1.06
Blaauwberg Strand	..	1.01	Malmesbury	..	1.94
Robben Island	..	1.30	Piquetberg	..	2.01
Strandfontein	..	n.r.	Van Rhynsdorp	..	n.r.
Camp's Bay	..	1.22	Glanwilliam (Gaol)	..	0.73
Fish Hoek	..	1.87	Do. (Couch)	..	0.78
Cape Point	..	0.71	Welbedacht	..	n.r.
Woodstock	..	4.03	Hopefield	..	0.57
			Lilyfontein	..	n.r.
			Zoutpan	..	0.47
11. SOUTH WEST:			IV. SOUTH COAST:		
Eerste River	..	2.12	Cape L'Agulhas	..	2.34
Klapmuts	..	2.98	Bredasdorp	..	2.62
Stellenbosch (Gaol)	..	2.84	Swellendam	..	2.78
Somerset West	..	2.80	Heidelberg	..	1.74
Paarl	..	2.06	Riversdale	..	1.65
Wellington (Gaol)	..	2.27	Dumbie Dykes	..	2.48
Do. (Huguenot Seminary)	..	1.93	Mossel Bay	..	2.09
Tulbagh	..	1.68	George	..	4.21
Kluitjes Kraal	..	2.37	Ezelzagt	..	n.r.
Ceres	..	3.65	Millwood	..	n.r.
Do. Road	..	1.94	Sour Flats	..	n.r.
Rocklands	..	1.27	Concordia	..	n.r.
Caledon	..	2.38	Knysna	..	3.40
Do. (Gordon)	..	2.03	Buffels Nek	..	n.r.
Worcester (Gaol)	..	0.46	Harkerville	..	n.r.
Do. (Meiring)	..	n.r.	Plettenberg Bay	..	2.83
Hex River	..	0.62	Forest Hall	..	n.r.
Lady Gray (Div. Robertson)	..	0.55	Blaauwkrantz	..	4.26
Robertson	..	0.75			
Robertson (Govt. Plantation)	..	0.83			

IV. SOUTH COAST—continued. INCHES.			VII. E. C. KARROO—continued. INCHES.		
Storm's River ..	..	3·69	Winterhoek ..	..	n.r.
Witte Els Bosch ..	..	4·04	Klipdrift (De Erf) ..	..	n.r.
Humansdorp ..	..	1·23	Kendrew ..	..	0·42
Cape St. Francis ..	..	1·92	Graaff-Reinet ..	..	0·60
Hankey ..	..	0·88	Do. (College) ..	..	0·40
Witteklip ..	..	1·89	New Bethesda ..	..	n.r.
Van Staaden's (upper) ..	..	1·77	Roo de Bloem ..	..	0·40
Do. (lower) ..	..	1·61	Wellwood ..	..	n.r.
Uitenhage ..	..	0·93	Do. Mountain ..	..	n.r.
Do (Inggs) ..	..	n.r.	Jansenville ..	..	0·45
Do Park ..	..	0·89	Patrysfontein ..	..	0·59
Dunbrody ..	..	0·88	Toegedacht ..	..	0·00
Port Elizabeth (Harbour) ..	..	1·02	Klipfontein ..	..	n.r.
Walmer Heights (near Port Elizabeth) ..	..	n.r.	Cranomere ..	..	n.r.
Tankatara ..	..	0·97	Pearston ..	..	0·80
Lottering ..	..	4·26	Somerset East ..	..	0·90
Shark's River (Nursery) ..	..	1·63	Do. (College) ..	..	0·97
Do (Convict Station) ..	..	1·10	Longhope ..	..	n.r.
Grootvader's Bosch ..	..	3·00	Middleton ..	..	n.r.
Karnmelk Rivier ..	..	3·10	Corndale (Div. Aberdeen) ..	..	n.r.
Melkhoutfontein ..	..	2·20	Cookhouse ..	..	n.r.
Vogel Vlei ..	..	1·56	Doornbosch, Zwagorshook ..	..	n.r.
Great Brak River ..	..	2·46	Middelwater ..	..	0·15
Victoria Park, P. E. ..	..	1·57	Darlington ..	..	n.r.
V. SOUTHERN KARROO:			Buffel's Kloof ..	..	1·18
Touws River (D. E.'s Office) ..	..	0·85	Klipplaat ..	..	0·41
Ladismith ..	..	1·28	Bloemhof ..	..	0·45
Amalienstein ..	..	0·72	Walsingham ..	..	0·80
Calitzdorp ..	..	0·90	Arundale ..	..	0·57
Oudtshoorn ..	..	1·57	VIII. NORTHERN KARROO:		
Vlaakte Plaats ..	..	n.r.	Calvinia ..	..	n.r.
Uniondale ..	..	1·98	Middlepost ..	..	n.r.
Kleinpoort ..	..	n.r.	Sutherland ..	..	0·45
Glencannor ..	..	n.r.	Rheboksfontein ..	..	n.r.
Verkeerde Vlei ..	..	0·62	Fraserburg ..	..	n.r.
Bok River ..	..	0·85	Onderste Doorns ..	..	n.r.
Triangle ..	..	0·42	Droogefontein ..	..	n.r.
Pietermeintjes ..	..	0·80	Gannapan ..	..	n.r.
Grootfontein ..	..	0·39	Carnarvon ..	..	0·90
VI. WEST CENTRAL KARROO:			Wagenaar's Kraal ..	..	n.r.
Matjesfontein ..	..	1·10	Brakfontein ..	..	0·45
Prince Albert Road ..	..	n.r.	Vogelstruisfontein ..	..	0·49
Fraserburg Road ..	..	0·40	Victoria West ..	..	0·26
Prince Albert ..	..	n.r.	Britstown ..	..	0·65
Zwartberg Pass ..	..	4·15	Murraysburg ..	..	0·13
Beaufort West ..	..	0·35	De Kruis ..	..	0·28
Dunedin ..	..	0·37	Richmond ..	..	1·42
Nel's Poort ..	..	n.r.	De Aar ..	..	0·91
Camfer's Kraal ..	..	0·86	Middlemount ..	..	n.r.
Lower Nel's Poort ..	..	0·65	Hanover ..	..	1·85
Baaken's Rug ..	..	0·41	Philip's Town ..	..	0·87
Willowmore ..	..	0·43	Boschfontein ..	..	0·66
Steytlerville ..	..	0·00	Petrusville ..	..	1·65
Roosplaats ..	..	n.r.	The Willows ..	..	n.r.
Laingsburg ..	..	0·57	Naauppoort ..	..	0·87
V I. EAST CENTRAL KARROO:			Middelburg ..	..	0·69
Aberdeen (Goal) ..	..	0·55	Colesberg ..	..	1·02
Do. (Bedford) ..	..	0·72	Tafelberg Hall ..	..	n.r.
Aberdeen Road ..	..	n.r.	Rietbult (Colesberg Bridge) ..	..	0·79
Rietfontein ..	..	0·18	Stonehills ..	..	n.r.
			Craddock ..	..	0·12
			Do. (Rose) ..	..	0·10

VIII. N. KARROO—continued.	INCHES.	X. SOUTH-EAST—continued.	INCHES
Varsch Vlei ..	n.r.	Sydney's Hope ..	1.10
Witmoos ..	n.r.	Cullendale ..	n.r.
Steynsburg ..	0.84	Adelaide ..	0.52
Do. (Nesemann) ..	n.r.	Atherstone ..	1.33
Daggaboer's Nek ..	n.r.	Alexandria ..	1.88
Springfield ..	n.r.	Salem ..	0.92
Quagga's Kerk ..	n.r.	Graham's Town (Gaol) ..	1.50
Tarkastad ..	0.47	Do. (Bact. Inst.) ..	1.23
Drummond Park ..	n.r.	Heatherton Towers (near	
Riet Vlei ..	n.r.	Graham's Town) ..	0.45
Brand Vlei ..	n.r.	Fort Beaufort ..	0.42
Williston ..	n.r.	Katberg ..	n.r.
Omdraai's Vlei ..	n.r.	Balfour ..	2.22
Zwagersfontein ..	n.r.	Seymour ..	0.94
Varken's Kop ..	1.00	Glencairn ..	1.46
Culmstook ..	n.r.	Alice ..	0.80
Doorskuilen ..	0.54	Lovedale ..	n.r.
Houwater Dam ..	n.r.	Port Alfred ..	n.r.
Hillmoor ..	1.06	Hogsback ..	n.r.
Glen Roy ..	0.74	Thaba N'doda ..	n.r.
Spitzkop ..	n.r.	Peddle ..	1.02
Phizantefontein ..	n.r.	Cathcart ..	0.15
	n.r.	Keiskama Hoek ..	0.51
Groot Vley, Thebus ..	n.r.	Dynamite ..	n.r.
Kleinhaasfontein ..	0.27	Thomas River ..	0.46
Scorpion's Drift ..	0.00	King William's Town ..	0.59
Beyersfontein ..	0.33	Do. Hospital ..	0.79
Haasfontein ..	0.69	Stutterheim (Wylde) ..	n.r.
Maraisburg ..	0.76	Do. (Besté) ..	0.51
		Dohne ..	n.r.
		Kubusie ..	n.r.
		Blaney ..	n.r.
		Kel Road ..	n.r.
		Evelyn Valley ..	n.r.
		Berlin ..	n.r.
		Isidenge ..	n.r.
		Pirle Forest ..	n.r.
		Quacu Forest ..	n.r.
		Kologha ..	n.r.
		Fort Jackson ..	n.r.
		Komgha ..	0.84
		Prospect Farm (Div. Komgha)	n.r.
		Hopewell Do. ..	n.r.
		East London, West ..	1.94
		Do. East ..	n.r.
		Fountain Head ..	n.r.
		Fort Cunynghame ..	n.r.
		Katberg Sanatorium ..	2.47
		Cuylerville ..	n.r.
		Bolo ..	n.r.
		Fort Fordyce ..	n.r.
		Sunnyside ..	0.98
		Scott's Bottom ..	1.19
		Exwell Park (Waku) ..	0.26
		Crawley ..	0.49
		Chiselhurst ..	1.09
X. NORTHERN BORDER :			
Pella ..	n.r.		
Kenhardt ..	n.r.		
Van Wyk's Vlei ..	0.25		
Prieska ..	n.r.		
Dunmurry ..	0.08		
Griqua Town ..	0.39		
Campbell ..	0.75		
Douglas ..	1.53		
Avoca (Herbert) ..	1.08		
Eskdale ..	1.50		
Hopetown ..	1.06		
Orange River ..	1.26		
Newlands (Div. Barkly West)	0.64		
Kimberley (Gaol) ..	1.69		
Do. (Stephens) ..	1.95		
Beaconsfield ..	n.r.		
Bellsbank (Div. Barkly West)	n.r.		
Grootdrink ..	n.r.		
Barkly West ..	1.06		
Uppington ..	n.r.		
Trooilapspan ..	n.r.		
New Year's Kraal ..	2.21		
Karree Kloof ..	3.60		
X. SOUTH-EAST :		XI. NORTH-EAST :	
Melrose ..	0.33	Venterstad ..	1.27
Varken's Kuil (Div. Bedford)	n.r.	Ellesmere ..	1.02
Fai-holt ..	0.55	Burnley, Cyphergat ..	0.00
Cheviot Fells (Bedford) ..	0.67	Burgersdorp ..	n.r.
Alicedale ..	n.r.	Do. (Le Roex) ..	n.r.
Bedf rd (Gaol) ..	0.90	Molteno Station ..	n.r.
Do. (Hall) ..	n.r.		

XI. NORTH-EAST—continued.		INCHES.	XII. KAFFRARIA—continued.		INCHES
Cyphergat ..	..	1-30	Willowvale ..	..	1-09
Thibet Park ..	..	0-29	Mount Fletcher ..	..	0-65
Sterkstroom ..	..	0-73	Elliotdale ..	..	0-27
Do. (Veitch) ..	..	n.r.	Mqanduli ..	..	n.r.
Rocklands ..	..	0-13	Matatiele ..	..	n.r.
Aliwal North (Gaal) ..	..	1-76	Umtata ..	..	0-11
Do. (Brown) ..	..	2-15	Qumbu ..	..	n.r.
Rietfontein ..	..	1-51	Kokstad ..	..	1-00
Buffelsfontein ..	..	1-58	Port St. John's ..	..	2-30
Hex's Plantation ..	..	n.r.	Umzimkulu ..	..	2-26
Carnarvon Farm ..	..	0-66	Woodliff ..	..	2-08
Jamestown ..	..	1-20	Tabankulu ..	..	n.r.
Queenstown (Gaal) ..	..	0-12	Kilrush ..	..	2-08
Do. (Beswick) ..	..	n.r.	Somerville (Div. Tsolo) ..	..	0-59
Dordrecht ..	..	n.r.	Tsomo ..	..	0-31
Tylden ..	..	n.r.	Bazoya ..	..	1-92
Snow Hill ..	..	n.r.	Mount Ayliff ..	..	1-21
Herschel ..	..	1-86	Sotaba ..	..	1-70
Lady Grey ..	..	n.r.	Flag-staff ..	..	1-31
Bolotwa (Contest) ..	..	n.r.	Insikeni ..	..	2-23
Lady Frere ..	..	0-31			
Avoca (Div. Barkly East) ..	..	n.r.	XIII. BASUTOLAND :		
Keilands ..	..	0-05	Mafeteng ..	..
Barkly East ..	..	1-13	Mohale's Hoek ..	..
Gleniyon ..	..	n.r.	Qacha's Nek ..	..	1-80
Gateshead ..	..	n.r.	Moyeni Quthing ..	..
Lyndene ..	..	1-01	Mayateyaneng ..	..	2-87
Mooifontein ..	..	0-89	Leribe ..	..
Poplar Grove ..	..	0-10	Butlia Buthe ..	..
Biesjesfontein ..	..	n.r.	Maseru ..	..
Whittlesea ..	..	0-36			
Halseton ..	..	1-02	XIV. ORANGE RIVER COLONY :		
Middlecourt ..	..	0-99	Bethulie ..	..	38
Sterkspruit ..	..	3-52	Kroonstad ..	..	n.r.
Doornkop ..	..	0-48			
Blikana ..	..	4-42	XV. NATAL :		
Table Hill ..	..	3-06	Durban, Observatory ..	..	2-33
XII. KAFFRARIA :			XVI. TRANSVAAL		
Slaats, Xalanga ..	..	n.r.	Johannesburg ..	..	n.r.
Ida, Xalanga ..	..	n.r.	Do. Cemetery ..	..	n.r.
Cala, Xalanga ..	..	n.r.			
Cofimvaba ..	..	n.r.	XVII. BECHUANALAND :		
Nqamakwe ..	..	0-61	Vryburg ..	..	0-65
Main ..	..	n.r.	Taungs ..	..	1-38
Engcobo ..	..	n.r.			
Butterworth ..	..	0-19	XVIII. RHODESIA :		
Kentani ..	..	0-37	Salisbury ..	..	n.r.
Maclear ..	..	0-55	Hope Fountain ..	..	2-09
Idutywa ..	..	n.r.	Geelong ..	..	n.r.

CURRENT MARKET RATES OF AGRICULTURAL PRODUCE.

The following were the Current Market Rates (Wholesale) of Agricultural Produce ruling at the several centres named on Saturday, 15th November, 1902.

CENTRE.	A	B.	C.	D.	E.	F.	G.	H.	J	K	L	M	N.	O	P	Q
	Wheat per 100 lb.	Wheat Flour per 100 lb.	Boer Meal per 100 lb.	Medhes. per 100 lb.	Meal per 100 lb.	Early per 100 lb.	Oats per 100 lb.	Oat hay per 100 lb.	Potatoes per 100 lb.	Tobacco (Boer Roll) per 100 lb.	Beef per lb.	Mutton per lb.	Fresh Butter per lb.	Eggs per doz.	Cattle Slaughter per cwt.	Sheep (Slaughter) per cwt.
Alhwal North	£ s d 0 10 0	£ s d 0 17 0	£ s d 0 12 0	£ s d 0 9 6	£ s d 0 11 0	£ s d 0 12 0	£ s d 0 17 0	£ s d 0 15 0	£ s d 1 2 0	£ s d 0 0 0	£ s d 0 0 11	£ s d 0 0 11	£ s d 1 6 0	£ s d 0 0 0	£ s d 13 6 0	£ s d 13 6 0
Beaufort West	0 14 0	0 17 0	0 11 0	0 13 0	0 13 0	0 12 0	0 17 0	0 15 0	0 16 0	0 0 0	0 0 9	0 0 8	0 2 0	0 2 0	£ 22 -	25
Burgheadorp	0 12 0	0 17 0	0 11 0	0 13 0	0 13 0	0 10 6	0 17 0	0 15 0	0 13 0	0 0 1	0 0 11	0 0 11	0 1 6	0 2 0	£ 22 -	25
Capetown	0 11 0	0 17 0	0 11 0	0 13 0	0 13 0	0 0 9	0 10 0	0 11 0	1 5 0	0 0 2	0 0 8	0 0 7	0 1 6	0 2 0	£ 22 -	25
Clanwilliam	0 10 0	0 17 0	0 11 0	0 13 0	0 13 0	0 0 7	0 0 6	0 0 6	0 0 0	0 0 1	0 0 7	0 0 0	0 1 6	0 1 6	£ 10 to £ 15	15 to 25
Colesberg	0 10 0	0 17 0	0 11 0	0 13 0	0 13 0	0 0 8	0 0 6	0 0 6	0 0 0	0 0 3	0 0 7	0 0 0	0 1 6	0 1 6	£ 10 to £ 15	15 to 25
Craddock	0 10 0	0 17 0	0 11 0	0 13 0	0 13 0	0 0 8	0 0 6	0 0 6	1 17 0	0 0 1	0 0 7	0 0 0	0 1 6	0 1 6	£ 10 to £ 15	15 to 25
Dordrecht	0 10 0	0 17 0	0 11 0	0 13 0	0 13 0	0 0 8	0 0 6	0 0 6	0 0 0	0 0 3	0 0 7	0 0 0	0 1 6	0 1 6	£ 10 to £ 15	15 to 25
East London	0 10 0	0 17 0	0 11 0	0 13 0	0 13 0	0 0 8	0 0 6	0 0 6	0 0 0	0 0 3	0 0 7	0 0 0	0 1 6	0 1 6	£ 10 to £ 15	15 to 25
Graaff-Reinet	0 10 0	0 17 0	0 11 0	0 13 0	0 13 0	0 0 8	0 0 6	0 0 6	0 0 0	0 0 3	0 0 7	0 0 0	0 1 6	0 1 6	£ 10 to £ 15	15 to 25
Graham's Town	0 10 0	0 17 0	0 11 0	0 13 0	0 13 0	0 0 8	0 0 6	0 0 6	0 0 0	0 0 3	0 0 7	0 0 0	0 1 6	0 1 6	£ 10 to £ 15	15 to 25
Kimberley	0 13 6	0 17 0	0 16 0	0 13 6	0 13 0	0 0 8	0 0 6	0 0 6	0 0 0	0 0 3	0 0 7	0 0 0	0 1 6	0 1 6	£ 10 to £ 15	15 to 25
King Wm's Town	0 13 0	0 17 6	0 12 0	0 13 0	0 10 0	0 0 8	0 0 6	0 0 6	0 0 0	0 0 3	0 0 7	0 0 0	0 1 6	0 1 6	£ 10 to £ 15	15 to 25
Malmesbury	0 11 0	0 13 0	0 12 0	0 10 0	0 10 0	0 0 8	0 0 6	0 0 6	0 0 0	0 0 3	0 0 7	0 0 0	0 1 6	0 1 6	£ 10 to £ 15	15 to 25

CURRENT MARKET RATES OF AGRICULTURAL PRODUCE—(continued).

CENTRE.	A	B	C.	D.	E	F.	G.	H.	J	K.	L.	M	N.	O	P	Q
	Wheat per 100 lb.	Wheat Flour per 100 lb.	Beer Meal. per 100 lb.	Mealies per 100 lb.	Mealie Meal. per 100 lb.	Barley per 100 lb.	Oats per 100 lb.	Oat-hay, per 100 lb.	Pota- toes per bag.	Tobacco (Boer Roll.) per lb.	Beef per lb.	Mutton per lb.	Fresh Butter per lb.	Eggs per doz	Cattle (Slaugh- ter)	Sheep (Slaugh- ter)
Mossel Bay	£ s. d. 0 13 0	£ s. d. 0 14 0	£ s. d. 0 13 0	£ s. d. 0 9 0	£ s. d. ...	£ s. d. 0 7 6	£ s. d. 0 16 0	£ s. d. 0 7 6	£ s. d. 1 5 0	£ s. d. 1 0 0	£ s. d. 0 0 9	£ s. d. 0 0 9	£ s. d. 0 1 6	£ s. d. 0 1 6	£ s. d. ...	£ s. d. ...
Pietermaritzburg Natal	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Port Alfred	...	...	...	...	...	0 13 0	...	...	0 12 6	...	0 0 10	0 1 0	0 1 6	0 1 9	...	...
Port Elizabeth	...	...	...	0 11 6	...	0 7 6	...	0 6 0	1 5 6	0 0 4	...	...	0 3 0	2 3	...	...
Queen's Town	0 10 0	0 15 3	0 8 6	1 0 0	0 7 0	0 9 0	0 0 7	0 8 1	6 0 0	2 3 0	0 0 9	0 0 5	0 1 9	1 1 4	...	...
Tarkastad	0 13 6	1 2 0	0 14 6	0 10 6	...	0 10 6	...	0 10 0	1 0 0	0 1 6	0 0 10	0 0 11	0 1 6	0 1 1	...	...
Vryburg	0 16 0	1 1 6	0 18 0	0 14 0	0 16 6	0 12 6	0 13 6	1 1 0	0 15 0	0 1 9	0 0 10	0 0 10	0 2 6	0 2 0	16 0	1 5 0
Worcester	0 12 6	0 16 6	0 12 6	0 12 0	0 13 0	0 11 0	0 12 0	0 8 0	1 4 6	0 0 9	0 0 8	0 0 9	0 1 10	1 0 15	0 0	1 15 0

NOTE.—Returns have not been received from the Civil Commissioners of Dordrecht, East London and Grahamstown.

